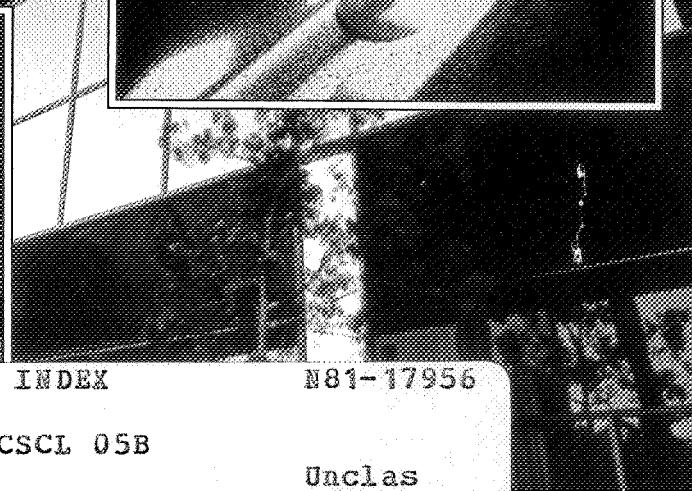
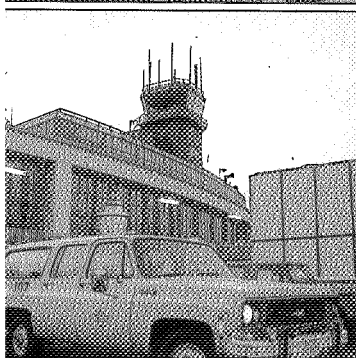
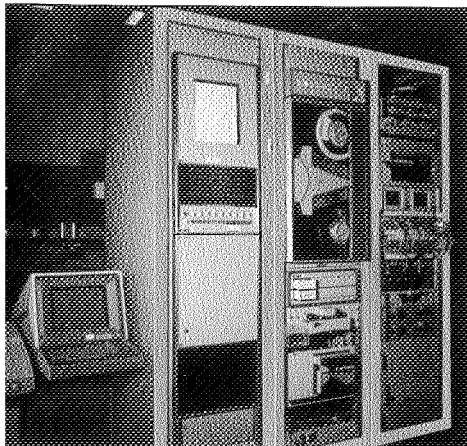


# NASA Tech Briefs Index 1979

National  
Aeronautics and  
Space  
Administration



{NASA-SP-5021(21)} NASA TECH BRIEFS INDEX  
1979 (National Aeronautics and Space  
Administration) 108 p

N81-17956

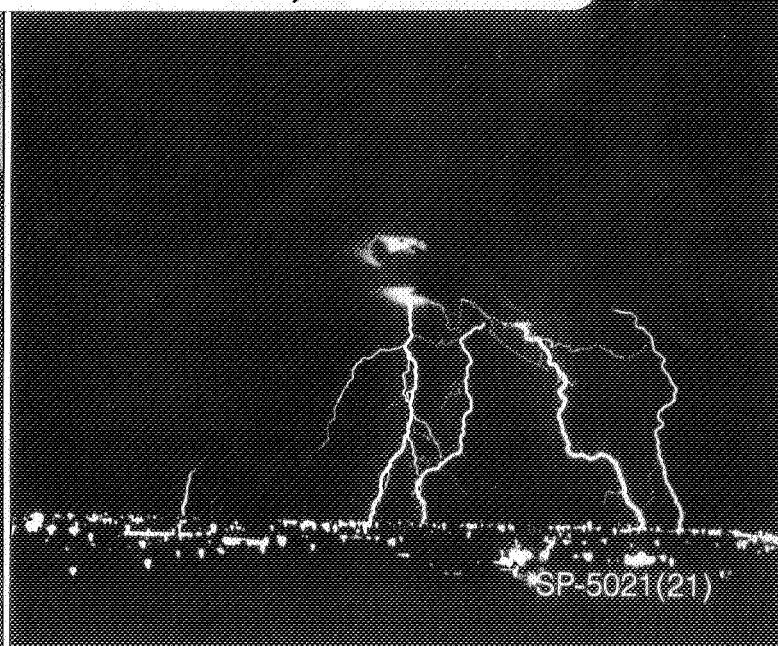
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Vol. 4 (Nos. 1-4) 1979



SP-5021(21)

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# INTRODUCTION

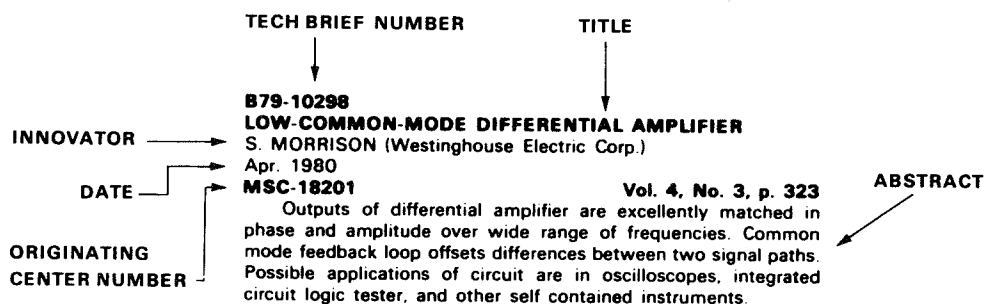
Tech Briefs are short announcements of new technology derived from the research and development activities of the National Aeronautics and Space Administration. These briefs emphasize information considered likely to be transferrable across industrial, regional, or disciplinary lines and are issued to encourage commercial application.

This *Index to NASA Tech Briefs* contains abstracts and four indexes -- subject, personal author, originating Center, and Tech Brief number -- for 1979 Tech Briefs.

## Abstract Section

The abstract section is divided into nine categories: Electronic Components and Circuits; Electronic Systems; Physical Sciences; Materials; Life Sciences; Mechanics; Machinery; Fabrication Technology; and Mathematics and Information Sciences. Within each category, abstracts are arranged sequentially by Tech Brief number.

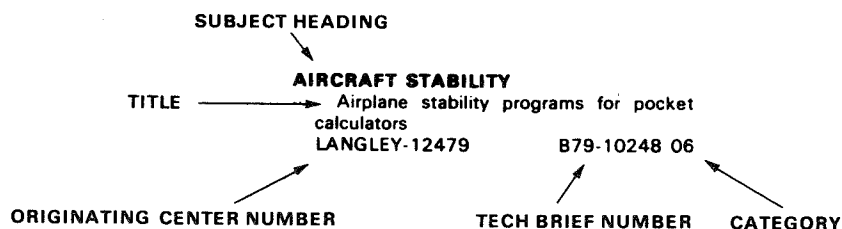
A typical abstract entry has these elements:



The originating Center number in each entry includes an alphabetical prefix that identifies the NASA Center where the Tech Brief originated. A list of prefixes and the corresponding Center names are given on page iii.

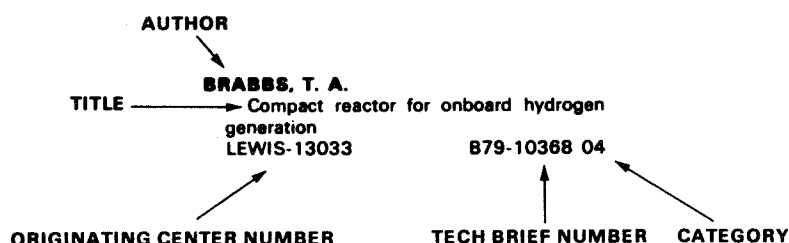
## Indexes

Four indexes are provided. The first is a subject index, arranged alphabetically by subject heading. Each entry in the subject index includes a Tech Brief number and a category number to aid the user in locating pertinent entries in the abstract section.

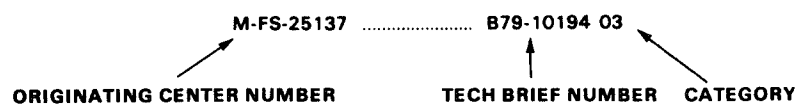


The January 1976 edition of the *NASA Thesaurus* (NASA SP-7050) is used as the authority for the indexing vocabulary that appears in the subject index. The *NASA Thesaurus* should be consulted in examining the current indexing vocabulary, including associated cross-reference structure. Only the subject terms that have been selected to describe the documents abstracted in this issue appear in the subject index. Copies of the *NASA Thesaurus* may be obtained from the National Technical Information Service at \$23.50 for the two-volume set.

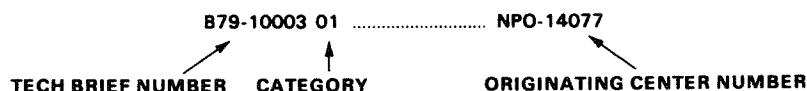
The second index is a personal author index. Entries in this index are arranged alphabetically by author's name. Tech Brief and category numbers are supplied to help the user find the appropriate entries in the abstract section.



The third index relates each originating Center number to the corresponding Tech Brief number and category. Entries in this index are arranged in alphanumeric order by Center number.



The fourth index relates each Tech Brief number to its originating Center number. Entries are arranged in ascending Tech Brief number order.





## Originating Center Prefixes

|         |   |
|---------|---|
| ARC     | Ames Research Center  |
| FRC     | Dryden Flight Research Center                               |
| GSFC    | Goddard Space Flight Center                                 |
| HQ      | NASA Headquarters   |
| KSC     | Kennedy Space Center  |
| LANGLEY | Langley Research Center                                     |
| LEWIS   | Lewis Research Center                                       |
| M-FS    | Marshall Space Flight Center                                |
| MSC     | Johnson Space Center (formerly Manned<br>Spacecraft Center) |
| NPO     | Jet Propulsion Laboratory/NASA Pasadena Office              |

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# Index to NASA Tech Briefs

June 1980

## Abstract Section

### 01 ELECTRONIC COMPONENTS AND CIRCUITS

**B79-10001**

#### **WRAPAROUND-CONTACT SOLAR CELLS**

C. R. BARAONA, T. M. KLUCHER, J. W. THORNHILL (Spectrolab, Inc.), and J. SCOTT-MONCK (Spectrolab, Inc.)

Aug. 1979 See also NASA-CP-2020 (N78-13527); NASA-CR-135202 (N77-32590)

**LEWIS-13089**

**Vol. 4, No. 1, p. 3**

Positive and negative electrical contacts are on back surface of wraparound-contact solar cell. With both terminals on nonilluminated side, cells can be connected back-to-back, and interconnection of many cells can be automated by using printed-circuit techniques. Cells are made by screen-printing layer of dielectric around edge of cell and extending top contact over dielectric to back surface. Wraparound also facilitates application of transparent covers and encapsulants. Efficiencies of cells are in excess of seventeen percent.

**B79-10002**

#### **EFFICIENT DICHROIC PLATE FOR MICROWAVES**

T. E. WISE (Bendix Corp.)

Aug. 1979

**GSFC-12171**

**Vol. 4, No. 1, p. 4**

Signal separator for dual-frequency antennas has interlaced crossed slots, or dipole elements. Plate reflects or transmits more efficiently than conventionally-designed microwave dichroic plates in which elements are not interlaced. Interlaced plate also increases bandwidth of dual-frequency antenna in which it is used.

**B79-10003**

#### **LOW-BACKLOBE MICROWAVE TRANSMITTING HORN**

D. A. BATHKER, S. A. BRUNSTEIN, P. W. CRAMER, and W. N. MOULE

Aug. 1979

**NPO-14077**

**Vol. 4, No. 1, p. 5**

By superimposing two hybrid modes, backlobes of S-band gain calibration horn are down 70 to 80 dB.

**B79-10004**

#### **FAST-RESPONSE POWER SAVER FOR INDUCTION MOTORS**

F. J. NOLA

Aug. 1979 See also B77-10154

**M-FS-23988**

**Vol. 4, No. 1, p. 6**

With control circuit, induction motors run more efficiently at light loads and respond to sudden load changes. It also anticipates power needs so that motor can respond instantly (to a load applied by a clutch, for example).

**B79-10005**

#### **VHF FREQUENCY MULTIPLIER**

J. A. CUSACK (Motorola, Inc.)

Aug. 1979

**NPO-13700**

**Vol. 4, No. 1, p. 7**

Low-power step-recovery-diode frequency multiplier generates 361-MHz signal. Diode conducts when ac waveform is positive at its upper terminal. When voltage is negative, diode continues to conduct stored charge in its junction.

**B79-10006**

#### **FIBER-OPTIC CROSSBAR SWITCH**

C. H. BELL

Aug. 1979

**KSC-11104**

**Vol. 4, No. 1, p. 9**

Switch automatically crosspatches optical signals with little loss. Device is furnished with local control and remote control. Local control can be manual from control panel or by computer data bus. In remote control, switch is slaved to remote manual panel computer data bus.

**B79-10007**

#### **IMPROVED INSB PHOTODIODE PREAMPLIFIER CIRCUIT**

R. L. ULRICH

Aug. 1979

**NPO-14418**

**Vol. 4, No. 1, p. 9**

Integrator compensates for background noise in Fourier spectrometer. Compensation is automatic.

**B79-10008**

#### **DECISION-DIRECTED AUTOMATIC GAIN CONTROL**

W. J. WEBER, III

Aug. 1979

**NPO-13639**

**Vol. 4, No. 1, p. 10**

Logic circuitry determines whether gain fluctuation are result of signal-strength changes or of a typical strings of like data symbols. Automatic Gain Control (AGC) system provides tight control that is independent of short-term, average, received signal energy and has negligible degrading effect on probability of error for signal.

**B79-10009**

#### **SELF-CALIBRATING THRESHOLD DETECTOR FOR NOISY SIGNALS**

J. R. BARNES (TRW, Inc.) and M. Y. HUANG (TRW, Inc.)

Aug. 1979

**MSC-16370**

**Vol. 4, No. 1, p. 10**

Single time-shared channel is not seriously affected by temperature and aging. Circuit should also be useful in industrial and consumer equipment. For example, it might be incorporated in telemetry for security systems.

**B79-10010**

#### **LOW-FREQUENCY ATTENUATOR CIRCUIT**

W. H. CASH, JR. (Martin Marietta Corp.) and J. T. POLYHEMUS (Martin Marietta Corp.)

## 01 ELECTRONIC COMPONENTS AND CIRCUITS

Aug. 1979

**FRC-11012**

**Vol. 4, No. 1, p. 11**

Circuit uses only single operational amplifier and few passive components to remove background noise from miniature 'wristwatch' pulse detector. It can be applied to other systems where background noise is slowly varying, such as ultrasonics, strain-gage sensors, and accelerometers.

**B79-10011**

**LOW-NOISE CURRENT REGULATOR**

J. BUNN (Xerox Corp.)

Aug. 1979

**NPO-14070**

**Vol. 4, No. 1, p. 12**

Modification of conventional regulator minimizes current drift. Current to be regulated flows through sensing resistor in series with load, producing voltage that is fed into operational amplifier. Other input into amplifier is reference voltage from Zener diode network.

**B79-10012**

**IMPROVED ISOLATION IN DOUBLE-BALANCED MIXERS**

P. H. STANTON

Aug. 1979

**NPO-14415**

**Vol. 4, No. 1, p. 13**

Bypass circuit eliminates unwanted leakage in output RF signal. Correction circuit was developed for phase-shift-keyed transmitters. Principle can be adapted to correct leakage in other types of RF circuitry as well.

**B79-10013**

**RELIABILITY OF IMAGING CCD'S**

J. R. BEAL (Martin Marietta Corp.), M. D. BORENSTEIN (Martin Marietta Corp.), R. A. HOMAN (Martin Marietta Corp.), D. L. JOHNSON (Martin Marietta Corp.), D. D. WILSON (Martin Marietta Corp.), and V. F. YOUNG (Martin Marietta Corp.)

Aug. 1979 See also NASA-MCR-78752 (N78-29352)

**M-FS-25039**

**Vol. 4, No. 1, p. 14**

Report on reliability of imaging charge-coupled devices (CCD's) is intended to augment rather meager existing information on CCD reliability. Study focuses on electrical and optical performance tests, packaging constraints, and failure modes of one commercially available device (Fairchild CCD121H).

**B79-10014**

**GROUP-DELAY STANDARDS**

R. W. BEATTY, L. J. DERR, and T. Y. OTOSHI

Aug. 1979

**NPO-13938**

**Vol. 4, No. 1, p. 14**

Delay-line standards have been tested by three independent laboratories using six different methods. Results are published in report showing delay values obtained from 15-, 30-, and 60-ns cables by different laboratories. Study of potential error sources indicates that reflection errors due to discontinuities at ends of cables are usually small.

**B79-10154**

**COMPUTATION-SAVING DIGITAL FILTER**

D. J. SOWADA (Honeywell, Inc.)

Dec. 1979

**MSC-18057**

**Vol. 4, No. 2, p. 167**

Two stage digital low-pass filter circuit that averages input over given period and filters average over comparatively slow rate, reduces computation, speed, and word-length requirements. Applications include data preprocessing before entry to central processor.

**B79-10155**

**IMPROVED SILICON/CARBON INTERFACE FOR SOLAR CELLS**

D. J. ZOOK (Honeywell, Inc.)

Dec. 1979

**NPO-14421**

**Vol. 4, No. 2, p. 168**

Resistance measurements showing that vitreous graphite remains almost wholly intact even after 1 hour of contact with silicon melt indicates that vitreous carbon may be superior to

rubbed-on graphite as interface between ceramic substrate and silicon layer of solar cell.

**B79-10156**

**IMPROVED METALIZED POLYCARBONATE CAPACITOR**

H. J. KELLERMAN (Component Research Co.)

Dec. 1979 See also NASA-CR-150460 (N77-85673)

**M-FS-25142**

**Vol. 4, No. 2, p. 168**

Modified metallized polycarbonate-film capacitor withstands 500 thermal cycles between 55 and 125 C replacing conventional devices which typically withstand 10 such cycles.

**B79-10157**

**BINARY-TO-MANCHESTER ENCODERS**

R. H. ST. CYR, III (Rockwell International Corp.), W. HU (The Garrett Corp.), and R. LATSHAW (The Garrett Corp.)

Dec. 1979

**MSC-16546**

**Vol. 4, No. 2, p. 169**

Two circuit system converts 16-bit-word binary encoded data to 24-bit Manchester II code to allow easy interface of flight simulators with aircraft communications equipment.

**B79-10158**

**VERSATILE DIGITAL SIGNAL PROCESSOR FOR DC TO DC CONVERTERS**

J. L. BIESS (TRW, Inc.), L. Y. INOUE (TRW, Inc.), and Y. YU (TRW, Inc.)

Dec. 1979 See also NASA-CR-135072 (N77-32398)

**LEWIS-13020**

**Vol. 4, No. 2, p. 170**

Digital signal processor (DSP) for dc-to-dc converters, processes all incoming signals and transmits correct signal to operate power switch.

**B79-10159**

**DIGITAL PHASE SHIFTER**

M. G. PERRY (Vought Corp.)

Dec. 1979

**LANGLEY-12338**

**Vol. 4, No. 2, p. 171**

Device requiring only TTL integrated circuits and single 5-volt power supply, varies phase shift of digital input over approximate range of 15 to 165 deg.

**B79-10160**

**IMPROVED READER FOR MAGNETICALLY-ENCODED ID CARDS**

T. T. WU (Caltech)

Dec. 1979

**NPO-13517**

**Vol. 4, No. 2, p. 172**

Hybrid demodulator in electronic card reader for magnetically encoded identification cards, accommodates variations in insertion speeds, yet is simpler and less expensive than equivalent all-digital circuits.

**B79-10161**

**TRANSDUCER WITH A SENSE OF TOUCH**

A. K. BEJCZY (Caltech) and G. PAINE (Caltech)

Dec. 1979

**NPO-14656**

**Vol. 4, No. 2, p. 173**

Matrix of pressure sensors determines shape and pressure distribution of object in contact with its surface. Output can be used to develop pressure map of objects' surface and displayed as array of alphanumeric symbols on video monitor.

**B79-10162**

**PHOTOCAPACITIVE INFRARED DETECTOR AND SOLAR CELL**

R. K. CROUCH, W. E. MILLER, J. A. MORIARTY (College of William and Mary), A. SHER (College of William and Mary), and Y. H. TSUO (College of William and Mary)

Dec. 1979

**LANGLEY-12345**

**Vol. 4, No. 2, p. 174**

Lightly doped semiconductor device, with transparent insulating layer based on capacitive response to radiant energy, exhibits excellent sensitivities at room temperature.

**B79-10163****OFFSET COMPENSATION FOR A/D CONVERTERS**

S. S. BROKL (Caltech) and W. J. HURD (Caltech)

Dec. 1979

**NPO-13438****Vol. 4, No. 2, p. 176**

Analog-to-digital (A/D) converter eliminates dc offset in final digitized signal as well as in analog input by using digital feedback for compensation. Circuit could prove useful in data processing applications in which analog-format data are entered at high rates, as in point-of-sale data input systems.

**B79-10164****IMPROVED RIPPLE REJECTION IN A PWM**

C. B. LOFTIS, JR. (Watkins-Johnson Co.)

Dec. 1979

**MSC-16923****Vol. 4, No. 2, p. 177**

Line-ripple rejection of pulse-width modulator is more than doubled by substituting exponentially increasing ramp voltage for conventional linear ramp, yet circuit is simplified.

**B79-10165****DEVELOPMENT OF CMOS INTEGRATED CIRCUITS**

F. BERTINO (RCA Corp.), A. FELLER (RCA Corp.), J. GREENHOUSE (RCA Corp.), T. LOMBARDI (RCA Corp.), A. MERRIAM (RCA Corp.), R. NOTO (RCA Corp.), S. OZGA (RCA Corp.), R. PRYOR (RCA Corp.), P. RAMONDETTA (RCA Corp.), and A. SMITH (RCA Corp.)

Dec. 1979 See also NASA-CR-150801 (N78-78414)

**M-FS-25121****Vol. 4, No. 2, p. 178**

Report documents life cycles of two custom CMOS integrated circuits: (1) 4-bit multiplexed register with shift left and shift right capabilities, and (2) dual 4-bit registers. Cycles described include conception as logic diagrams through design, fabrication, testing, and delivery.

**B79-10294****INDUCTORLESS TUNED CIRCUIT FOR HIGH FREQUENCIES**

L. KLEINBERG

Apr. 1980

**GSFC-12410****Vol. 4, No. 3, p. 319**

Inductorless tuned circuit functions as filter, amplifier, or oscillator at radio frequencies. Circuit is based on two directly-coupled transistors operated at their transition frequency and fabricated as integrated circuit on single silicon chip.

**B79-10295****TEMPERATURE CONTROLLER FOR CRYSTAL RESONATORS**

T. R. TURLINGTON (Westinghouse Electric Corp.)

Apr. 1980

**NPO-14507****Vol. 4, No. 3, p. 320**

Controller operates on less than 5W prime power and heats crystal from -10 C to 75 C in less than 45s. Unit is faster and more accurate (to within 0.7 C) than other inexpensive controllers and faster and less expensive than very precise controllers in vacuum flasks.

**B79-10296****DIRECT-CURRENT DRIVE FOR AC MOTORS**

J. N. SOLARIO (Caltech)

Apr. 1980

**NPO-14427****Vol. 4, No. 3, p. 321**

Dual windings of ac motor serve as output transformer for dc/ac inversion. Method makes use of low-cost commutatorless ac motors, powered by solar energy, batteries and other dc sources possible.

**B79-10297****MEASURING SIGNAL-TO-NOISE RATIO AUTOMATICALLY**

L. A. BERGMAN (Caltech) and A. R. JOHNSTON (Caltech)

Apr. 1980

**NPO-14582****Vol. 4, No. 3, p. 322**

Automated method of measuring signal-to-noise ratio in digital communication channels is more precise and 100 times faster than previous methods used. Method based on bit-error-rate (B&R)

measurement can be used with cable, microwave radio, or optical links.

**B79-10298****LOW-COMMON-MODE DIFFERENTIAL AMPLIFIER**

S. MORRISON (Westinghouse Electric Corp.)

Apr. 1980

**MSC-18201****Vol. 4, No. 3, p. 323**

Outputs of differential amplifier are excellently matched in phase and amplitude over wide range of frequencies. Common mode feedback loop offsets differences between two signal paths. Possible applications of circuit are in oscilloscopes, integrated circuit logic tester, and other self contained instruments.

**B79-10299****BIDIRECTIONAL MANCHESTER REPEATER**

J. FERGUSON (Rockwell International Corp.)

Apr. 1980

**MSC-18414****Vol. 4, No. 3, p. 324**

Bidirectional Manchester repeater is inserted at periodic intervals along single bidirectional twisted pair transmission line to detect, amplify, and transmit bidirectional Manchester 11 code signals. Requiring only 18 TTL 7400 series IC's, some line receivers and drivers, and handful of passive components, circuit is simple and relatively inexpensive to build.

**B79-10300****SOLID-STATE POWER CONTROLLER**

D. A. FOX (Westinghouse Electric Corp.) and J. S. FULLEMANN (Westinghouse Electric Corp.)

Apr. 1980

**MSC-16661****Vol. 4, No. 3, p. 325**

Compact, solid state, electric-power controller switches power on and off at remote load, limits current drawn by load, and shuts off (with 2- to 3- second trip time) in case of short circuit. Lightweight efficient hybrid unit operates at 28 volts dc and at maximum currents of from 3 to 2 amperes.

**B79-10301****VOLTAGE-CONTROLLED ATTENUATOR WITH LOW PHASE SHIFT**

G. F. LUTES, JR. (Caltech)

Apr. 1980

**NPO-14347****Vol. 4, No. 3, p. 326**

Five megahertz RF (radiofrequency) signal attenuator utilizing RF quadrature hybrid, and optically viable-resistance load controlled by lamp circuit exhibits little phase shift. Circuit is designed to help distribute standard RF signal of controlled amplitude, and phase throughout complex of facilities could be useful in application to precision test equipment and communication electronics.

**B79-10302****IMPROVED INSULATOR LAYER FOR MIS DEVICES**

W. E. MILLER

Apr. 1980

**LANGLEY-12455****Vol. 4, No. 3, p. 327**

Insulating layer of supersonic conductor such as LaF sub 3 has been shown able to impart improved electrical properties to photoconductive detectors and promises to improve other metal/insulator/semiconductor (MIS) devices, e.g., MOSFET and integrated circuits.

**B79-10303****MINIMIZING SPIKES IN SWITCHING-REGULATOR CIRCUITS**

W. T. MCILYMAN (Caltech)

Apr. 1980

**NPO-14505****Vol. 4, No. 3, p. 328**

Circuit, employing tapped inductor to back-bias rectifying diodes and extra diode to commutate current, minimizes current spikes that cause premature transistor failure in switching-regulator circuits.

**B79-10304****DIGITAL AUTOMATIC GAIN CONTROL**

## 01 ELECTRONIC COMPONENTS AND CIRCUITS

Z. UZDY (Caltech)

Apr. 1980

**NPO-14236**

**Vol. 4, No. 3, p. 329**

Performance analysis, used to evaluate fitness of several circuits to digital automatic gain control (AGC), indicates that digital integrator employing coherent amplitude detector (CAD) is best device suited for application. Circuit reduces gain error to half that of conventional analog AGC while making it possible to automatically modify response of receiver to match incoming signal conditions.

**B79-10305**

**SURGE PROTECTION WITH AUTOMATIC RESET**

R. B. CHAN (Hughes Aircraft Co.) and M. C. SINELLI (Hughes Aircraft Co.)

Apr. 1980

**MSC-18356**

**Vol. 4, No. 3, p. 329**

Circuit turns power off automatically when surge occurs and restores power when voltage returns to normal. Transmitters and other equipment are protected in electrically noisy environments; however, if three transient overvoltages (or continuous overvoltage) are sensed within 3.2 seconds, circuit turns power supply off permanently since serious failure may have occurred.

**B79-10306**

**BUBBLE-DOMAIN DETECTOR**

R. L. STERMER and C. D. NICHOLS

Apr. 1980

**LANGLEY-12241**

**Vol. 4, No. 3, p. 330**

Bubble domain detector employs transformer coupling for data retrieval. Method makes multidetection practical by time multiplexing. Multiplexer matrices can be scaled in 4 by 4, 4 by 8, 4 by 16, or larger combinations without diode steering.

**B79-10307**

**CMOS ANALOG SWITCHES FOR ADAPTIVE FILTERS**

C. E. DIXON (Motorola, Inc.)

Apr. 1980

**NPO-14442**

**Vol. 4, No. 3, p. 332**

Adaptive active low-pass filters incorporate CMOS (Complementary Metal-Oxide Semiconductor) analog switches (such as 4066 switch) that reduce variation in switch resistance when filter is switched to any selected transfer function.

**B79-10308**

**MEASURING CHARGE NONUNIFORMITY IN MOS DEVICES**

J. MASERJIAN (Caltech) and N. ZAMANI (Caltech)

Apr. 1980

**NPO-14585**

**Vol. 4, No. 3, p. 333**

Convenient method of determining inherent lateral charge non-uniformities along silicon dioxide/silicon interface of metal-oxide-semiconductor (MOS) employs rapid measurement of capacitance of interface as function of voltage at liquid nitrogen temperature. Charge distribution is extracted by fast-Fourier-transform analysis of capacitance voltage (C-V) measurement.

**B79-10309**

**VARIABLE-CLOCK-RATE A/D CONVERTER**

P. C. LIPOMA (Lockheed Electronics Co.)

Apr. 1980

**MSC-18541**

**Vol. 4, No. 3, p. 333**

Analog-to-digital (A/D) converter operates at two different rates (slow and fast) so that low amplitude noise is reduced without loss of transient response. During tracking, when sensitivity is important, slow clock reduces noise. In search mode, when signal may change rapidly, fast clock ensures rapid response.

**B79-10310**

**STRAIN RELIEF FOR POWER-CABLE CONNECTORS**

W. T. DEAN, III (Rockwell International Corp.)

Apr. 1980

**MSC-19497**

**Vol. 4, No. 3, p. 334**

Easily fabricated grommet composed of poly-tetrafluoroethylene cylinder, containing U-shaped channels equally spaced around periphery, is used in power cable connectors to

relieve strain on cables. Utilization of grommets provides more ease in cable insertion and removal. Potential applications include wiring in large residential and commercial buildings.

**B79-10311**

**INTERLEAVED SHIELDING FOR CABLES**

G. R. READ (Rockwell International Corp.)

Apr. 1980

**MSC-18369**

**Vol. 4, No. 3, p. 335**

Interleaved wrapping of metal foil shielding on power cables gives more effective electromagnetic interference protection without increasing amount of material or weight.

**B79-10312**

**ISOLATOR/RETAINER FOR CONNECTORS**

J. L. ALPENIA (Rockwell International Corp.) and W. F. ELLIS (Rockwell International Corp.)

Apr. 1980

**MSC-18527**

**Vol. 4, No. 3, p. 335**

Double-ended cap holds mating plugs and receptacle, preventing electrical contact between them when not in use. Cap maintains continuous electrical ground between plug and receptacle protecting against electromagnetic-interference pickup. Device is also useful for isolation of sensitive circuits from each other during storage, transit, or testing.

**B79-10313**

**STABLE S-BAND POWER AMPLIFIER**

C. E. HERMESMEYER (Motorola, Inc.)

Apr. 1980

**NPO-14443**

**Vol. 4, No. 3, p. 336**

Relatively linear amplifier with automatic level control (ALC) preserves modulation characteristics of phase-shift-key (PSK) modulated S-band transmitter.

**B79-10314**

**LIMITING AMPLIFIER FOR MICROWAVES**

J. N. OWENS (Hughes Aircraft Co.)

Apr. 1980

**MSC-18471**

**Vol. 4, No. 3, p. 337**

Limiting amplifier, using gallium arsenide field effect transistor (FET), delivers constant-amplitude drive signal to KU-band traveling wave tube (TWT) thus preventing distortion in output from TWT.

**B79-10315**

**MOISTURE PENETRATION IN MICROCIRCUIT PACKAGES**

J. J. LICARI (Rockwell International Corp.) and K. L. PERKINS (Rockwell International Corp.)

Apr. 1980

**M-FS-25087**

**Vol. 4, No. 3, p. 338**

Results of study of hybrid microcircuit packages tested in temperature/humidity environments ranging from 25 C at 98 percent relative humidity (RH) to 85 C at 85 percent RH shows that package susceptibility to moisture is affected more by high temperature than humidity, and room temperature tests are inadequate for testing package seal integrity.

**B79-10444**

**VARIABLE-RESOLUTION COUNTER**

J. I. CLEMMONS, JR.

Jun. 1980

**LANGLEY-12530**

**Vol. 4, No. 4, p. 463**

Variable-resolution counter circuit increases time interval that n-bit binary counter can measure by using multivalued input clock. Circuit allows measurement of time intervals beyond capability of single n-bit counter while maintaining reasonable resolution.

**B79-10445**

**WINDOW COMPARATOR FOR VOLTAGES**

J. M. BLACK

Jun. 1980

**FRC-10090**

**Vol. 4, No. 4, p. 464**

Circuit determines whether voltage is within preselected range of voltage levels. Device requires fewer components than previous window comparators and is less susceptible to errors from



reference drift. Comparator is useful in process-control circuitry, measuring instruments, and checkout equipment.

**B79-10446****LOW-EMI SOLID-STATE RELAY**

W. D. MUSKA (United Aircraft Corp.)

Jun. 1980

**MSC-12698**

Vol. 4, No. 4, p. 465

Solid state relay electromagnetic interference (EMI) generated when switching ac power to load. Relay could find uses in circuits that are particularly susceptible to electrical noise or contain sensitive components.

**B79-10447****REAL-TIME DIGITAL INTEGRATOR**

A. L. RUBIN (Caltech), H. TAYLOR (Caltech), and D. E. WALLIS (Caltech)

Jun. 1980

**NPO-14530**

Vol. 4, No. 4, p. 465

Field programmable logic array (FPLA) is used to make 3-bit arithmetic logic unit (ALU) for large integrator that can be read and cleared while new data is added to begin new integral. Arrangement of device can provide for full carry/lookahead capability with minimum gate delays.

**B79-10448****BIASED-RECEIVER DIGITAL INTERFACE**

F. C. FITZGERALD (IBM Corp.)

Jun. 1980

**MSC-14968**

Vol. 4, No. 4, p. 466

Coupling circuits converts TTL signals to higher voltage, higher current logic with good noise rejection. Depending on selected components, circuit may also be adapted to low-power applications.

**B79-10449****SENSOR/AMPLIFIER FOR WEAK LIGHT SOURCES**

D. J. DESMET (Univ. of Alabama), A. J. JASON (Univ. of Alabama), and A. C. PARR (Univ. of Alabama)

Jun. 1980

**M-FS-25025**

Vol. 4, No. 4, p. 467

Light sensor/amplifier circuit detects weak light converts it into strong electrical signal in electrically noisy environment. Circuit is relatively simple and uses inexpensive, readily available components. Device is useful in such applications as fire detection and photographic processing.

**B79-10450****OVERLOAD PROTECTION FOR SWITCHING REGULATORS**

E. LACHOCHI (RCA Corp.)

Jun. 1980

**MSC-18513**

Vol. 4, No. 4, p. 468

Circuit protects all output lines of switching regulator against overloads without requiring current sensors on every line. If overload is sensed, device short circuits bias on switching transistor so that power is rapidly cut off from loads. Circuit also includes delay network to inhibit erroneous operation during startup.

**B79-10451****AZIMUTH CORRELATOR DESIGN FOR IC CHIP**

V. C. TYREE (Caltech) and C. WU (Caltech)

Jun. 1980

**NPO-14614**

Vol. 4, No. 4, p. 469

Azimuth correlator circuit synthetic-aperture radar (SAR) is designed for single integrated circuit (IC) chip. Azimuth correlator modules constructed with sets of such chips could make real-time signal processing possible. Primary advantages are realized in areas of weight and power requirement reductions.

**B79-10452****RISE-TIME CONTROL IN SATURATED AMPLIFIERS**

C. E. THEALL (The Singer Co.)

Jun. 1980

**MSC-14934**

Vol. 4, No. 4, p. 470

Inductor in transistor emitter circuit controls output rise time of saturated amplifier thereby reducing radiated noise and

distortion in subsequent circuits. Device also improves current balancing in push/pull transformer circuits. Resulting circuits are self compensating for temperature.

**B79-10453****LOW-COST, LIGHTWEIGHT RF TRANSFER SWITCH**

D. L. OLSSON (TRW, Inc.)

Jun. 1980

**MSC-16907**

Vol. 4, No. 4, p. 472

Low cost miniature DPDT 'half-size-crystal-can' relay serves as RF transfer switch for 1.0-W S-band signals. Switch can be used in miniature communication equipment operations at vhf-to-microwave frequencies. Device presents principal gains over conventional RF switches on space saving, and weight and cost reduction.

**B79-10454****A RELIABLE SOLID-STATE RF TRANSFER SWITCH**

R. W. DODD (Watkins-Johnson Co.)

Jun. 1980

**MSC-16890**

Vol. 4, No. 4, p. 472

Highly-reliable lightweight solid-state RF (radio frequency) transfer switch replaces less reliable mechanical switch in handling medium power for S-band power amplifier.

**B79-10455****SEMICONDUCTOR STEP-STRESS TESTING**

H. B. MEEKS and F. VILLELLA

Jun. 1980 See also B79-10456 - B79-10475

**M-FS-25329**

Vol. 4, No. 4, p. 473

Report documents behavior of discrete diodes and transistors in extensive power and temperature overstress tests. Thirty nine devices were tested in groups designated: (1) power overstress, and (2) and (3) temperature overstress. Results are of interest to users of tested components and engineers in conduction of similar tests.

**B79-10456****JANTX1N645-1 DIODE**

Innovator not given (Special Products Division of DCA Reliability Lab.) Jun. 1980 See also B79-10455; B79-10457 - B79-10475

**M-FS-25243**

Vol. 4, No. 4, p. 474

Samples manufactured by Semtech were tested. Devices showed excessive reverse leakage currents during each of three test phases. Results of testing suggest that failures occurred because of static charge on surface of encapsulant, caused by thermal decomposition of paint.

**B79-10457****JANTX1N649-1 DIODE**

Innovator not given (Special Products Division of DCA Reliability Lab.) Jun. 1980 See also B79-10455; B79-10456; B79-10458; - B79-10475

**M-FS-25344**

Vol. 4, No. 4, p. 474

Samples manufactured by Semtech and Micro Semiconductor were tested. Both lots did quite well in tests. Plot showing cumulative failure distribution for group 2 was drawn for both lots. Graphs for groups 1 and 3 failures could not be drawn because of extremely low occurrence.

**B79-10458****JANTX/N746A DIODE**

Innovator not given (Special Products Division of DCA Reliability Lab.) Jun. 1980 See also B79-10455 - B79-10457; B79-10459 - B79-10475

**M-FS-25245**

Vol. 4, No. 4, p. 474

Samples manufactured by Siemens and Motorola were tested. Both lots did well in groups 1 and 3 testing. Failure analysis was done for group 2 tests because of excessive reverse-leakage-current failure mode.

**B79-10459****JANTX/N759A VOLTAGE REGULATING DIODE**

Innovator not given (Special Products Div. of DCA Reliability Lab.) Jun. 1980 See also B79-10455 - B79-10458; B79-

## 01 ELECTRONIC COMPONENTS AND CIRCUITS

10460 - B79-10475

**M-FS-25246**

**Vol. 4, No. 4, p. 475**

Diodes manufactured by Texas Instruments and Siemens performed well in group 1 testing. Failure analysis shows that group 2 testing is most detrimental to both sample lots. Same failure mode of excessive I(sub)R leakage can be clearly seen in group 3 testing.

**B79-10460**

**JANTX/N937B ZENER DIODE**

Innovator not given (Special Products Division of DCA Reliability Lab.) Jun. 1980 See also B79-10455 - B79-10459; B79-10461 - B79-10475

**M-FS-15247**

**Vol. 4, No. 4, p. 475**

Zener diodes manufactured by Motorola and Siemens were tested. Apparent failure mode in all three groups was B (sub) V (Zener-breakdown-voltage) minimum failure. Both manufacturers had approximately same amount of failure in each testing.

**B79-10461**

**JANTX/N972B ZENER DIODE**

Innovator not given (Special Products Division of DCA Reliability Lab.) Jun. 1980 See also B79-10455 - B79-10460; B79-10462 - B79-10475

**M-FS-25248**

**Vol. 4, No. 4, p. 475**

Tested Zeners were manufactured by Siemens and Motorola. Devices tested in groups 1 and 2 did quite well. Notable damage to both manufacturer lots occurred in group 2 testing.

**B79-10462**

**JANTX/N98B ZENER DIODE**

Innovator not given (Special Products Division of DCA Reliability Lab.) Jun. 1980 See also B79-10455 - B79-10461; B79-10463 - B79-10475

**M-FS-25249**

**Vol. 4, No. 4, p. 475**

Tested diodes were manufactured by Motorola and Siemens. Both sample lots performed well in groups 1 and 3 testing. Group 2 testing was most detrimental of three groups. Extreme heat was big factor in failure mode.

**B79-10463**

**JANTX/N1202A SWITCHING DIODE**

Innovator not given (Special Products Division of DCA Reliability Lab.) Jun. 1980 See also B79-10455 - B79-10462; B79-10464 - B79-10475

**M-FS-25250**

**Vol. 4, No. 4, p. 475**

General Electric and International Rectifier switching diodes were tested. Group 2 testing proved to be most damaging to both lots. In group 2 testing many visual failures were seen in samples from both manufacturers.

**B79-10464**

**JANTX1N3893 DIODE**

Innovator not given (Special Products Division of DCA Reliability Lab.) Jun. 1980 See also B79-10455 - B79-10463; B79-10465 - B79-10475

**M-FS-25266**

**Vol. 4, No. 4, p. 476**

Diodes manufactured by Siemens and Motorola were tested. Testing of Motorola diodes was stopped in all 3 groups because 50% failure-rate limit was reached. Siemens lot endured more testing in groups 1 and 2 and completed testing on group 3. Failure analysis was performed for group 2 testing.

**B79-10465**

**JANTX1N4570A ZENER DIODE**

Innovator not given (Special Products Division of DCA Reliability Lab.) Jun. 1980 See also B79-10455 - B79-10464; B79-10466 - B79-10475

**M-FS-25268**

**Vol. 4, No. 4, p. 476**

Siemens and Motorola diodes were tested. Of three stress groups, group 2 prove to be most detrimental to both sample lots.

**B79-10466**

**JANTX1N5415 DIODE**

Innovator not given (Special Products Division of DCA Reliability

Lab.) Jun. 1980 See also B79-10455 - B79-10465; B79-10467 - B79-10475

**M-FS-25270**

**Vol. 4, No. 4, p. 476**

Tested diodes were manufactured by Semtech and Micro Semiconductor. Micro Semiconductor diodes experienced no failures in groups 2 and 3 testing and only four failures in group 1.

**B79-10467**

**JANTX1N5417 DIODE**

Innovator not given (Special Products Division of DCA Reliability Lab.) Jun. 1980 See also B79-10455 - B79-10466; B79-10468 - B79-10475

**M-FS-25271**

**Vol. 4, No. 4, p. 476**

Tested diodes were manufactured by Micro Semiconductor and Semtech. Significant damage occurred only in group 1 testing.

**B79-10468**

**JANTX1N5420 DIODE**

Innovator not given (Special Products Division of DCA Reliability Lab.) Jun. 1980 See also B79-10455 - B79-10467; B79-10469 - B79-10475

**M-FS-25272**

**Vol. 4, No. 4, p. 476**

Testing of sample lots from Unitrode and Micro Semiconductor had to be stopped in group 1 test because 50% failure rate limit was reached. Failure analysis was performed only for group 2 testing because of apparent failure mode.

**B79-10469**

**JANTX1N5550 SWITCHING DIODE**

Innovator not given (Special Products Division of DCA Reliability Lab.) Jun. 1980 See also B79-10455 - B79-10468; B79-10470 - B79-10475

**M-FS-25273**

**Vol. 4, No. 4, p. 476**

Tested devices were manufactured by Semtech and Micro Semiconductor. Failure rate of Semtech diodes exceeded 50% in all three test groups. Failure mode could not be precisely determined.

**B79-10470**

**JANTX1N5552 SWITCHING DIODE**

Innovator not given (Special Products Division of DCA Reliability Lab.) Jun. 1980 See also B79-10455 - B79-10469; B79-10471 - B79-10475

**M-FS-25274**

**Vol. 4, No. 4, p. 477**

Switching diodes manufactured by Micro Semiconductor and Semtech were tested. In groups 2 and 3 there were no Micro Semiconductor catastrophic failures. Testing of both lots was stopped in group 1 test because of 50% failure rate.

**B79-10471**

**JANTX1N5554 SWITCHING DIODE**

Innovator not given (Special Products Division of DCA Reliability Lab.) Jun. 1980 See also B79-10455 - B79-10470; B79-10472 - B79-10475

**M-FS-25275**

**Vol. 4, No. 4, p. 477**

Micro Semiconductor and Semtech diodes were tested. In group 1 tests Micro Semiconductor and Semtech lot testing was stopped because of excess failure rate. Failure analysis was performed on groups 1 and 3 because of apparent failure mode.

**B79-10472**

**JANTX1N5614 SWITCHING DIODE**

Innovator not given (Special Products Division of DCA Reliability Lab.) Jun. 1980 See also B79-10455 - B79-10471; B79-10473 - B79-10475

**M-FS-25276**

**Vol. 4, No. 4, p. 477**

Diode manufactured by Micro Semiconductor and Semtech were tested. Main failure mode was surface inversions caused by leakage of contaminants through cracks in glass. Most failures in groups 2 and 3 were visual.

**B79-10473**

**JANTX1N5615 SWITCHING DIODE**

Innovator not given (Special Products Division of DCA Reliability Lab.) Jun. 1980 See also B79-10455 - B79-10472; B79-

10474 - B79-10475

**M-FS-25277****Vol. 4, No. 4, p. 477**

Diodes manufactured by Semtech and Micro Semiconductor were tested. Both sample lots exceeded 50% fail-rate in all groups. Failure analysis was performed for groups 2 and 3.

**B79-10474****JANTX1N5618 SWITCHING DIODE**

Innovator not given (Special Products Division of DCA Reliability Lab.) Jun. 1980 See also B79-10455 - B79-10473; B79-10475

**M-FS-25278****Vol. 4, No. 4, p. 478**

Diodes tested were manufactured by Semtech and Micro Semiconductor. Semtech sample lots completed all three testings with only one catastrophic failure. All three Micro Semiconductor lots had several failure that were submitted for failure analysis.

**B79-10475****JANTX1N5619 DIODE**

Innovator not given (Special Products Division of DCA Reliability Lab.) Jun. 1980 See also B79-10455 - B79-10474

**M-FS-25279****Vol. 4, No. 4, p. 478**

Tested diodes were manufactured by Semtech and Micro Semiconductor. Failures were experienced in groups 1 and 2 testing.

## 02 ELECTRONIC SYSTEMS

**B79-10015****ELECTRONIC PICTURES FROM CHARGED-COUPLED DEVICES**

D. H. MCCANN (Westinghouse Electric Corp.), A. P. TURLY (Westinghouse Electric Corp.), and M. WHITE (Westinghouse Electric Corp.)

Aug. 1979

**GSFC-12324****Vol. 4, No. 1, p. 17**

Imaging system uses charge-coupled devices (CCD's) to generate TV-like pictures with high resolution, sensitivity, and signal-to-noise ratio. It combines detectors for five spectral bands as well as processing and control circuitry all on single silicon chip.

**B79-10016****IMPROVING LOW-ILLUMINATION VIDEO**

R. L. SAPIRSTEIN (Lockheed Missiles & Space Co., Inc.)

Aug. 1979

**MSC-14841****Vol. 4, No. 1, p. 18**

Nonmoving TV pictures are improved by electronic system that removes much of the 'snow' or random noise in image. System integrates and averages picture elements in real time and thereby allows easier and more accurate evaluation of image, visually and by computer.

**B79-10017****TV AUDIO AND VIDEO ON THE SAME CHANNEL**

J. B. HOPKINS (Westinghouse Electric Corp.)

Aug. 1979

**MSC-16241****Vol. 4, No. 1, p. 19**

Transmitting technique adds audio to video signal during vertical blanking interval. SIVI (signal in the vertical interval) is used by TV networks and stations to transmit cuing and automatic-switching tone signals to augment automatic and manual operations. It can also be used to transmit one-way instructional information, such as bulletin alerts, program changes, and commercial-cutaway aural cues from the networks to affiliates. Additionally, it can be used as extra sound channel for second-language transmission to bilingual stations.

**B79-10018****REAL-TIME VIDEO-IMAGE ANALYSIS**

R. ESKENAZI, M. J. RAYFIELD, and Y. YAKIMOVSKY

Aug. 1979

**NPO-14282****Vol. 4, No. 1, p. 20**

Digitizer and storage system allow rapid random access to video data by computer. RAPID (random-access picture digitizer) uses two commercially-available, charge-injection, solid-state TV cameras as sensors. It can continuously update its memory with each frame of video signal, or it can hold given frame in memory. In either mode, it generates composite video output signal representing digitized image in memory.

**B79-10019****ELIMINATING CLUTTER IN SYNTHETIC-APERTURE RADAR**

A. JAIN

Aug. 1979

**NPO-14035****Vol. 4, No. 1, p. 21**

Diffusion technique reduces clutter noise in coherent SAR (synthetic-aperture radar) image signal without degrading its resolution. Technique makes radar-mapped terrain features more obvious. It also has potential application in holographic microscopy.

**B79-10020****AZIMUTH CORRELATOR FOR SYNTHETIC APERTURE RADAR**

W. E. ARENS

Aug. 1979

**NPO-14019****Vol. 4, No. 1, p. 22**

Azimuth correlation simulates large antenna aperture. It uses charge-coupled-device (CCD) technology to simplify complex, digital, signal-improvement process. In aircraft or spacecraft, correlator processes images onboard and in real time to simplify transmission to ground stations.

**B79-10021****SIGNAL SEPARATOR FOR DUAL-FREQUENCY ANTENNA**

R. W. HARTOP

Aug. 1979

**NPO-14022****Vol. 4, No. 1, p. 23**

Replacement for dichroic plate reduces noise. Besides being easier to install, flange is less expensive to fabricate. Most important, the flange reduces antenna contribution to system noise; whereas, dichroic plate increases noise temperature by 2 or 3 degrees.

**B79-10022****COMPONENTS FOR AN S-BAND COMMUNICATION SUBSYSTEM**

C. W. ROOK (Motorola, Inc.)

Aug. 1979

**NPO-13955****Vol. 4, No. 1, p. 24**

S-band communication components include low-pass filter, diplexer, and transmit output filter, which prevent radiation or coupling of unwanted transmitter spurious outputs and to provide isolation while transmitter and receiver operate simultaneously.

**B79-10023****LED DISPLAY FOR SOLO AIRCRAFT INSTRUMENT NAVIGATION**

R. K. CROUCH, W. L. KELLY, VI, L. J. LINA, and B. D. MEREDITH

Aug. 1979

**LANGLEY-12292****Vol. 4, No. 1, p. 26**

Solo pilot's task is made easier through convenient display of landing and navigation data. Use of display shows promise as more efficient means of presenting sequential instructions and data, such as course heading, altitude, and radio frequency, to minimize pilot's workload during solo instrument flight.

**B79-10024****CABLE-FAULT LOCATOR**

R. L. CASON, J. J. MCSTAY, and A. P. HEYMANN, SR. (Planning Research Corp.)

Aug. 1979

**KSC-10899****Vol. 4, No. 1, p. 27**

Inexpensive system automatically indicates location of

## 02 ELECTRONIC SYSTEMS

short-circuited section of power cable. Monitor does not require that cable be disconnected from its power source or that test signals be applied. Instead, ground-current sensors are installed in manholes or at other selected locations along cable run. When fault occurs, sensors transmit information about fault location to control center. Repair crew can be sent to location and cable can be returned to service with minimum of downtime.

### B79-10025

#### CLOUD-TO-GROUND LIGHTNING DETECTOR

C. L. LENNON

Aug. 1979

KSC-11099

Vol. 4, No. 1, p. 28

Device senses electric-field changes and hf radiation to distinguish cloud-to-ground flashes from cloud-to-cloud flashes.

### B79-10026

#### RELIABLE INVERTER SYSTEMS

S. NAGANO

Aug. 1979

NPO-14163

Vol. 4, No. 1, p. 29

Base driver with common-load-current feedback protects paralleled inverter systems from open or short circuits. Circuit eliminates total system oscillation that can occur in conventional inverters because of open circuit in primary transformer winding. Common feedback signal produced by functioning modules forces operating frequency of failed module to coincide with clock drive so module resumes normal operating frequency in spite of open circuit.

### B79-10027

#### MONITORING DISASTER AREAS VIA SATELLITES

W. E. SIVERTSON, JR.

Aug. 1979

LANGLEY-12344

Vol. 4, No. 1, p. 30

Easily-displayed low-cost radar targets signal distress to orbiting satellites. Effective medical and evacuation efforts can be carried out successfully around globe due to this early warning. Another application is to measure rainfall, surface runoff, evaporation, and soil moisture.

### B79-10028

#### SIMPLER CABLING AND POWER LINK FOR REMOTE READOUTS

J. C. PERRY

Aug. 1979

GSFC-12411

Vol. 4, No. 1, p. 30

Display power and segment data are multiplexed over same coaxial line. Thus, only one wire and return lead are needed, and single power supply at central location can service all remote displays.

### B79-10029

#### A CLOSED-LOOP CONTROL-LOADING SYSTEM

B. R. ASHWORTH and R. V. PARRISH

Aug. 1979 See also NASA-TN-D-8371(N77-16020)

LANGLEY-12167

Vol. 4, No. 1, p. 32

Langley Differential Maneuvering Simulator (DMS) realistically simulates two aircraft operating in differential mode. It consists of two identical fixed-base cockpits and dome projection systems. Each projection system consists of sky/Earth projector and target-image generator and projector. Although programmable control forces are small part of overall system, they play large role in providing pilot with kinesthetic cues.

### B79-10030

#### A TELEPHONE MULTILINE SIGNALING SYSTEM

P. C. TOOLE, J. L. BELT (Planning Research Corp.), R. GOODLOE (Planning Research Corp.), and D. B. LEINIGER (Planning Research Corp.)

Aug. 1979

KSC-11023

Vol. 4, No. 1, p. 33

Telephone system interconnects users of from one to eight telephone lines in network. System is useful in coordinating activities in large plants and installations. It permits spontaneous conferences, paging, and monitoring from key locations.

### B79-10031

#### FADER AND RAMP SHAPER REPLACE LINEAR FILTERS

T. A. ROBINSON (Honeywell, Inc.)

Aug. 1979

MSC-16115

Vol. 4, No. 1, p. 34

Digital 'fader' or 'ramp shaper' circuits replace linear filters in suppressing switching transients and instabilities within servocontrol systems. Circuits can be optimized to introduce no attenuation, transport delay, or phase lags in new output signal.

### B79-10032

#### OPTICAL MEMORIES IN DIGITAL COMPUTING

C. O. ALFORD (Georgia Institute of Technology) and T. K. GAYLORD (Georgia Institute of Technology)

Aug. 1979

M-FS-23897

Vol. 4, No. 1, p. 35

High capacity optical memories with relatively-high data-transfer rate and multiport simultaneous access capability may serve as basis for new computer architectures. Several computer structures that might profitably use memories are: a) simultaneous record-access system, b) simultaneously-shared memory computer system, and c) parallel digital processing structure.

### B79-10166

#### TELETYPE TEST UNIT

R. H. COUCH and H. C. BEALL (Research Triangle Inst.)

Dec. 1979

LANGLEY-12527

Vol. 4, No. 2, p. 181

Device may be used to facilitate testing and fault isolation in teletype and modem systems that are used for communication by people who having hearing disabilities. Unit uses CMOS digital integrated circuitry which may be operated from relatively inexpensive battery of any voltage from 3 to 18 volts.

### B79-10167

#### LIMITED SCAN DUAL-BAND HIGH-GAIN ANTENNA

P. W. CRAMER, JR. (Caltech) and K. E. WOO (Caltech)

Dec. 1979

NPO-14038

Vol. 4, No. 2, p. 182

Dual band communication and tracking antenna concept combines S- and X-band high gain performance in near field cassagrainian configuration. Design incorporating subreflector in near field of feed permits limited electronic scanning with phased array feed of approximately subreflector size placed in region between subreflector and main reflector.

### B79-10168

#### DUAL HYBRID MODE FEED HORN

D. A. BATHKER (Caltech) and R. F. THOMAS (Caltech)

Dec. 1979

NPO-13594

Vol. 4, No. 2, p. 183

Antenna feed horn is combination of corrugated, round, and tapered waveguide configurations that are dimensioned to excite He sub 11 and He sub 12 modes to illuminate reflector antenna more uniformly than antenna horns excited only in He sub 11 mode. Horn is adaptable to both symmetrical and asymmetrical Cassagrainian antennas.

### B79-10169

#### WIDE-BEAM FLUSH-MOUNTED ANTENNA

H. ELLIS, JR. (Rockwell Intern. Corp.)

Dec. 1979

MSC-16800

Vol. 4, No. 2, p. 184

Compact six-element S-band phased-array antenna produces exceptionally broad, circularly polarized beam and wide bandwidth. Suitable for flush mounting, antenna may be useful in high altitude aircraft, communication satellites, and ground-based moving vehicles.

### B79-10170

#### HIGHER GAIN FOR FEEDBACK CONTROL SUBJECT TO VIBRATIONS

J. F. GARREN, JR. and F. R. NIESSEN

Dec. 1979 See also NASA-TM-X-74004 (N77-17103)

LANGLEY-12215

Vol. 4, No. 2, p. 185



Complementary filtering and simple electronic model greatly increase amount of useful gain achievable in feedback control system subjected to environmental vibration. Technique has increased useful gain from 2 to 4 and increased bandwidth from less than 0.5 Hz to over 1 Hz.

**B79-10171**

**FAULT-TOLERANT COMPUTER SYSTEM**

A. A. AVIZIENIS (Caltech), D. A. RENNELS (Caltech), and M. ERCEGOVAC (Caltech)  
Dec. 1979

**NPO-14562**

**Vol. 4, No. 2, p. 186**

More reliable computers could be assembled by connecting four proposed VSLI 'building block' circuits with built-in error detection to standard microprocessors and memory devices to form self checking computer module. Each building block detects its own malfunctions and single bit errors found in memory.

**B79-10172**

**MAXIMUM-LIKELIHOOD DATA DECODER**

M. E. ALBERDA (Caltech)  
Dec. 1979

**NPO-13574**

**Vol. 4, No. 2, p. 188**

Digital convolutional decoder circuit for data communication receiver employs Viterbi decoding algorithm to quickly and efficiently decode data on basis of 'maximum likelihood' computations.

**B79-10173**

**MICROPROCESSOR-BASED INTERFACE FOR OCEANOGRAPHY**

G. R. HANSEN (Caltech)  
Dec. 1979

**NPO-14566**

**Vol. 4, No. 2, p. 189**

Ocean floor imaging system incorporates five identical microprocessor-based interface units, each assigned to specific sonar instrument to simplify system. Central control module based on same microprocessor eliminates need for custom tailoring hardware interfaces for each instrument.

**B79-10174**

**GUIDANCE SYSTEM FOR A ROVING VEHICLE**

J. A. MILLER (Caltech)  
Dec. 1979 See also B78-10026

**NPO-14376**

**Vol. 4, No. 2, p. 190**

Computer controlled guidance system for semiautonomous robot guides robot in incompletely defined environment. System operates in real time avoiding obstacles detected by 'stereo television and laser range finder eyes.'

**B79-10175**

**MULTIPLE-CAMERA AUTOMATIC CONTROLLER**

E. T. BLOAM  
Dec. 1979

**LEWIS-12711**

**Vol. 4, No. 2, p. 192**

Device automatically controls exposure time and frame sequencing for three remotely located cameras used for photographing interior of internal-combustion chamber through special viewing ports. Controller is highly applicable in many areas where closely monitored remote photography is required.

**B79-10176**

**NAVIGATION-AID POWER SYSTEMS**

G. L. GOLTZ (Caltech), L. M. KAISER (Caltech), and H. WEINER (Caltech)  
Dec. 1979

**NPO-14466**

**Vol. 4, No. 2, p. 193**

Design synthesis and performance analysis (DSPA) program package is collection of subroutines used for computation of design and performance characteristics of viable solar-array-charged battery powered system for flashing-lamp buoys employed as maritime aids to navigation.

**B79-10316**

**VIDEO-COMPRESSION SCHEME**

H. LUM, JR. and Y. MATSUMOTO

Apr. 1980

**ARC-10984**

**Vol. 4, No. 3, p. 341**

Video compression circuit divides picture into elements transmitted at reduced data rate. By sampling elements along diagonals in N-by-N picture blocks, system gives picture quality comparable to that of standard television and superior to most pseudorandom sampling schemes.

**B79-10317**

**ANALOG ACTUATOR-PISTON MEMORY**

B. A. SABLE (United Technologies Corp.)

Apr. 1980

**MSC-12697**

**Vol. 4, No. 3, p. 342**

Simple analog control system of digitally controlled actuator uses 'stopped' position of actuator as 'memory' and potentiometer as sensing element during power failure to reload drive circuit to value equal to its last position preceding power loss.

**B79-10318**

**MICROPROCESSOR-CONTROLLED RECEIVER**

T. L. GRANT and Y. MATSUMOTO

Apr. 1980

**ARC-11275**

**Vol. 4, No. 3, p. 342**

Microprocessor and radio receiver are combined in low-cost, high performance, data communications receiver. Hybrid receiver automatically acquires and tracks UHF channels despite low signal-to-noise ratios, fading signal strengths, and high Doppler offset. It also performs digital bit synchronization, which has traditionally required separate unit.

**B79-10319**

**CENTERING IMAGES IN SPLIT-SCREEN TV DISPLAY**

J. B. HOPKINS (Westinghouse Elec. Corp.)

Apr. 1980

**MSC-18399**

**Vol. 4, No. 3, p. 343**

Circuit for creating 'split screen' television pictures allows operator to select any portion of each image to be displayed without moving cameras.

**B79-10320**

**ALL-DIGITAL QPSK MODULATOR**

R. W. BURGESS (Hughes Aircraft Co.) and R. L. JULIAN (Hughes Aircraft Co.)

Apr. 1980

**MSC-16922**

**Vol. 4, No. 3, p. 344**

Circuit consisting of only four components (2 IC chips and 2 time delay devices) modulates RF signal with 2 asynchronous digital data signals. Digital modulator is virtually free of amplitude modulation, is not subject to temperature effects from other components, dissipates less power, and is far simpler than its analog predecessors.

**B79-10321**

**LOW-PROFILE COMMUNICATIONS ANTENNA**

I. P. YU (Lockheed Electronics Co.)

Apr. 1980

**MSC-16683**

**Vol. 4, No. 3, p. 345**

Low profile antenna constructed using microstrip techniques are used for elliptical or circularly polarized signals. Operating range is determined by thickness of dielectric layer and size of antenna element. Compact size and shape along with other desirable features may make antenna useful for communication on trains and other road vehicles.

**B79-10322**

**DUAL-FREQUENCY MICROWAVE ANTENNA**

D. A. BATHKER (Caltech), S. A. BRUNSTEIN (Caltech), A. C. LUDWIG (Caltech), and P. D. POTTER (Caltech)

Apr. 1980 See also B79-10021; B79-10002

**NPO-13091**

**Vol. 4, No. 3, p. 346**

Single antenna using two feed horns (one for receiving and radiation X-band signals, and one for S-band signals), in conjunction with ellipsoid reflector and dichroic plate, can accommodate two different frequencies simultaneously.

## 02 ELECTRONIC SYSTEMS

**B79-10323**

### **INTERFEROMETER ANTENNA-ARRAY SYSTEM**

J. A. KAISER, JR.

Apr. 1980

**GSFC-12365**

**Vol. 4, No. 3, p. 346**

System immune from interference locates signals in space without ambiguity. Signals from each antenna element are processed through three different mixing stages.

**B79-10324**

### **LOCK DETECTOR FOR NOISE-CODED SIGNALS**

L. M. CARSON (Motorola, Inc.)

Apr. 1980

**NPO-14435**

**Vol. 4, No. 3, p. 348**

Circuit indicates when receiver is locked on pseudorandom-noise-coded signal. Circuit is used for reception of such digitally coded signals as scrambled voice messages or scrambled video. Circuit determines when receiver generated code is correct and synchronized with incoming signal so that receiver can track signal.

**B79-10476**

### **VARIABLE-RESOLUTION FACSIMILE SYSTEM**

P. C. LIPOMA (Lockheed Electronics Co., Inc.)

Jun. 1980

**MSC-18516**

**Vol. 4, No. 4, p. 481**

Variable-element scanner in facsimile transmission system allows adjustment of resolution as dictated by document requirement. Device reduces transmission time when high resolution is not needed.

**B79-10477**

### **CONSERVING POWER IN COMPUTER MEMORIES**

Innovator not given (Honeywell, Inc.) Jun. 1980

**LANGLEY-11952**

**Vol. 4, No. 4, p. 482**

Power control system for electronic memories saves energy by switching off power to portions of memories that are not in use. Although power-off period lasts only a few microseconds or milliseconds, it amounts to sizable part of overall read/write cycle timer; large energy savings can be realized.

**B79-10478**

### **DIGITAL GENERATION OF COMMAND-ENCODER WAVE-FORMS**

W. S. ATARAS (General Electric Co.)

Jun. 1980

**GSFC-12203**

**Vol. 4, No. 4, p. 482**

Command encoder for command data system produces sinusoidal signals by purely digital means.

**B79-10479**

### **BINARY SYNCHRONOUS SIMULATOR**

J. R. ROGERS, III

Jun. 1980

**KSC-11096**

**Vol. 4, No. 4, p. 483**

Flexible simulator for trouble-shooting data transmission system uses binary synchronous communications protocol to produce error-free transmission of data between two points. Protocol may be used to replace display generator or be directly fed to display generator.

**B79-10480**

### **SWITCHING REDUCES COMPUTER POWER REQUIREMENT**

Innovator not given (Honeywell, Inc.) Jun. 1980

**LANGLEY-11958**

**Vol. 4, No. 4, p. 484**

Network of power switches activates only selected TTL circuits necessary for that particular time interval. Power that was fed to inactive circuits and dissipated is no longer applied. Because of this, system can use much higher, smaller power source.

## 03 PHYSICAL SCIENCES

**B79-10033**

### **SOLAR-POWERED PUMP**

Innovator not given (Calmac Manufacturing Co.) Aug. 1979

**M-FS-23996**

**Vol. 4, No. 1, p. 39**

Collector pump of solar-heating systems is powered by concentrating solar collector separate from main collector. Solar driven pump eliminates need for electrical supplies to integral components.

**B79-10034**

### **TRANSPARENT SOLAR CELL MODULE**

G. J. ANTONIDES (Lockheed Missiles and Space Co.), P. A. DILLARD (Lockheed Missiles and Space Co.), W. M. FRITZ (Lockheed Missiles and Space Co.), and D. P. LOTT (Lockheed Missiles and Space Co.)

Aug. 1979

**NPO-14304**

**Vol. 4, No. 1, p. 40**

Modified solar cell module uses high transmission glass and adhesives, and heat dissipation to boost power per unit area by 25% (9.84% efficiency based on cell area at 60 C and 100 mW/sq cm flux). Design is suited for automatic production and is potentially more cost effective.

**B79-10035**

### **SOLAR POWER CONDITIONER**

L. JAN, N. JOHNSON, S. LINDENA, W. T. MCCLYMAN, and J. N. SOLARIO

Aug. 1979

**NPO-14356**

**Vol. 4, No. 1, p. 41**

Efficient power-conditioning circuit designed to utilize maximum power available from solar cell array, controls output of array so that excess energy not needed by load is diverted to charge batteries for reserve power when sufficient sunlight is not available.

**B79-10036**

### **SUN TRACKER FOR CLEAR OR CLOUDY WEATHER**

D. R. SCOTT and P. R. WHITE

Aug. 1979 See also NPO-13652 (B78-10186)

**M-FS-23999**

**Vol. 4, No. 1, p. 42**

Sun tracker orients solar collector so that they absorb maximum possible sunlight without being fooled by bright clouds, holes in cloud cover, or other atmospheric conditions. Tracker follows sun within 0.25 deg arc and is accurate within + or - 5 deg when sun is hidden.

**B79-10037**

### **ASSEMBLING SOLAR-CELL ARRAYS**

J. T. BLOCH (Boeing Co.), R. T. HANGER (Boeing Co.), and F. W. NICHOLS (Boeing Co.)

Aug. 1979

**NPO-14416**

**Vol. 4, No. 1, p. 43**

Modified 70 mm movie film editor automatically attaches solar cells to flexible film substrate. Machine can rapidly and inexpensively assemble cells for solar panels at rate of 250 cells per minute. Further development is expected to boost production rate to 1000 cells per minute.

**B79-10038**

### **VARIABLE-SHAPE SOLAR-ENERGY CONCENTRATOR**

C. G. MILLER (California Polytechnic State Univ. of San Luis Obispo, Calif.) and J. H. PHOL (California Polytechnic State Univ. of San Luis Obispo, Calif.)

Aug. 1979

**NPO-13736**

**Vol. 4, No. 1, p. 43**

Proposed low cost three dimensional tracking solar concentrator fabricated from lightweight, flexible polymeric film membrane is controlled in shape by differential pressure loading. Fine adjustments to shape could be made by mounting electrets or magnets on membrane or applying electric or magnetic field.

**B79-10039****ALL-ELECTRIC GAS DETECTOR**

J. S. MARGOLIS

Aug. 1979

**NPO-14341****Vol. 4, No. 1, p. 45**

Modified optoacoustic gas detector identifies gases by measuring pressure-induced voltage change in electric signals. It can detect water vapor, atmospheric fluorocarbons, or certain nitrous or nitric compounds that indicate presence of explosives.

**B79-10040****LOW-NOISE SPECTROPHONE**

M. J. KAVAYA and J. S. MARGOLIS

Aug. 1979

**NPO-14362****Vol. 4, No. 1, p. 46**

Spectrophone, using continuous laser beam, operates at lower noise levels and thus detects trace amounts of gases with greater sensitivity.

**B79-10041****IMPROVED COAL-SLURRY PIPELINE**

W. L. DOWLER

Aug. 1979

**NPO-14425****Vol. 4, No. 1, p. 47**

High strength steel pipeline carries hot mixture of powdered coal and coal derived oil to electric-power-generating station. Slurry is processed along way to remove sulfur, ash, and nitrogen and to recycle part of oil. System eliminates hazards and limitations associated with anticipated coal/water-slurry pipelines.

**B79-10042****FUEL GAS FROM BIODIGESTION**

R. C. MCDONALD (National Space Tech. Laboratory) and B. C. WOLVERTON (National Space Tech. Laboratory)

Aug. 1979

**M-FS-23957****Vol. 4, No. 1, p. 48**

Biodigestion apparatus produces fuel gas (primarily methane) for domestic consumption, by anaerobic bacterial digestion of organic matter such as aquatic vegetation. System includes 3,786-1 cylindrical container, mechanical agitator, and simple safe gas collector for short term storage.

**B79-10043****OPTICALLY COUPLING TUNABLE DIODE LASERS**

D. M. ROBINSON and C. W. ROWLAND

Aug. 1979

**LANGLEY-12438****Vol. 4, No. 1, p. 49**

Proposed optical coupling, using lenses and mirrors that replace complex mechanical systems, can combine separate tunable diode laser outputs and expand wavelength range. Method uses single cooler housing and requires no moving parts within cooler assembly.

**B79-10044****IMPROVED FLIGHT-SIMULATOR VIEWING LENS**

W. M. KAHLBAUM

Aug. 1979 See also NASA-TP-1066 (N78-12829)

**LANGLEY-12251****Vol. 4, No. 1, p. 50**

Triplet lens system uses two acrylic plastic double convex lenses and one polystyrene plastic single convex lens to reduce chromatic distortion and lateral aberration, especially at large field angles within in-line systems of flight simulators.

**B79-10045****PROJECTION OPTICS FOR A LASER VELOCIMETER**

D. B. RHODES

Aug. 1979

**LANGLEY-12328****Vol. 4, No. 1, p. 51**

Projection optics for laser velocimeter (LV) scans constant focal volume over entire focus-position range. Optics thus simplify LV measurements over large flow fields (such as those encountered in wind tunnels) by eliminating calibrations required when focal volume varies with position.

**B79-10046****A CHEVRON BEAM-SPLITTER INTERFEROMETER**

J. B. BRECKINRIDGE

Aug. 1979

**NPO-14502****Vol. 4, No. 1, p. 51**

Fully tilt compensated double-pass chevron beam splitter, that removes channelling effects and permits optical phase tuning, is wavelength independent and allows small errors in alignment that are not tolerated in Michelson, Machzender, or Sagnac interferometers. Device is very useful in experiments where background vibration affects conventional interferometers.

**B79-10047****OPTICAL SYSTEM FOR MULTISPECTRAL SCANNER**

R. C. STOKES and N. G. KOCH (Lockheed Electronics Co.)

Aug. 1979

**MSC-18255****Vol. 4, No. 1, p. 52**

Optical system designed for scanning eight spectra bands simultaneously from aircraft at variety of speeds and altitudes is compact, easy to align, and reliable. System efficiently and effectively circumvents many problems associated with previous systems.

**B79-10048****MARINE CHLOROPHYLL A ANALYSIS**

R. W. JOHNSON

Aug. 1979 See also NASA-TP-1021 (N78-13628)

**LANGLEY-12293****Vol. 4, No. 1, p. 54**

Quantitative distribution maps of chlorophyll a and other important environmental parameters of coastal zones are prepared by regression analysis of sea-truth data and data collected by aircraft multispectral scanners.

**B79-10049****PRODUCTION OF LARGE-AREA ELECTRETS**

P. K. C. PILLAI, E. SHIVERS, and O. WEAVER

Aug. 1979

**M-FS-23186****Vol. 4, No. 1, p. 55**

Charge injection techniques are used in two methods of producing low cost homocharged electrets.

**B79-10050****THEORY OF BACK-SURFACE-FIELD SOLAR CELLS**

O. VONROOS

Aug. 1979

**NPO-14451****Vol. 4, No. 1, p. 57**

Report describes simple concise theory of back-surface-field (BSF) solar cells (npp + junctions) based on Shockley's depletion-layer approximation and cites superiority of two-junction devices over conventional unijunction cells.

**B79-10051****RANKINE-CYCLE SOLAR-COOLING SYSTEMS**

H. M. WEATHERS

Aug. 1979

**M-FS-25094****Vol. 4, No. 1, p. 57**

Report reviews progress made by three contractors to Marshall Space Flight Center and Department of Energy in developing Rankine-cycle machines for solar cooling and testing of commercially available equipment involved.

**B79-10052****RANKINE-CYCLE HEATING AND COOLING SYSTEMS**

Innovator not given (AiResearch Manufacturing Co.) Aug. 1979

**M-FS-23998****Vol. 4, No. 1, p. 58**

Design for domestic or commercial solar heating and cooling system based on Rankine heat pump cycle includes detailed drawings, performance data, equipment specifications, and other pertinent information.

**B79-10053****DESIGN INFORMATION FOR SOLAR-HEATING SYSTEMS**

Innovator not given (Colt, Inc.) Aug. 1979

**M-FS-25097****Vol. 4, No. 1, p. 58**

Report contains preliminary design information for two solar-heating and hot water systems presently under development. Information includes quality control data, special tooling specifica-

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tions, hazard analysis, and preliminary training program for installation contractors.

#### B79-10054

##### SOLAR-HEATING SYSTEM-PERFORMANCE TESTS

Innovator not given (IBM Federal Systems Div.) Aug. 1979 See also M-FS-25022 (B78-10494)

M-FS-25116

Vol. 4, No. 1, p. 58

Report describes comprehensive performance tests of complete solar powered space and hot water heating system to verify its suitability for field installation in small single family dwellings.

#### B79-10055

##### PERFORMANCE TEST FOR A SOLAR WATER HEATER

Innovator not given (Wyle Labs., Inc.) Aug. 1979

M-FS-25114

Vol. 4, No. 1, p. 59

Two reports describe procedures and results of performance tests on domestic solar powered hot water system. Performance tests determine amount of energy collected by system, amount of energy delivered to solar source, power required to operate system and maintain proper tank temperature, overall system efficiency, and temperature distribution in tank.

#### B79-10056

##### AIR SOLAR COLLECTOR-INSTALLATION PACKAGE

Innovator not given (Owens-Illinois, Inc.) Aug. 1979

M-FS-25031

Vol. 4, No. 1, p. 59

Installation package for air solar collector contains parts list, operating instructions, and performance specifications.

#### B79-10057

##### STATIC LOAD TESTING OF A LIQUID SOLAR COLLECTOR

Innovator not given (Wyle Labs., Inc.) Aug. 1979 See also M-FS-23890 (B78-10208)

M-FS-25115

Vol. 4, No. 1, p. 59

Report summarizes results of tests in which flat-plate liquid solar collectors were subjected to static pressure loads and examined for leakage and other damage.

#### B79-10058

##### LIQUID SOLAR COLLECTOR-PERFORMANCE EVALUATION

Innovator not given (Wyle Labs., Inc.) Aug. 1979 See also M-FS-25010 (B78-10498); M-FS-25082 (B78-10499)

M-FS-25090

Vol. 4, No. 1, p. 59

Report summarizes thermal performance tests and measurements of incident-of-angle modified and transient response of flat-plate solar collector.

#### B79-10059

##### WEATHERING OF A LIQUID-FILLED SOLAR COLLECTOR

Innovator not given (Wyle Labs., Inc.) Aug. 1979 See also M-FS-23972 (B78-10477)

M-FS-25113

Vol. 4, No. 1, p. 60

Report describes procedures and results of tests for effects of weathering on flat-plate liquid solar collector. Thermal performance was measured before and after natural weathering for 15-1/2 months by using Marshall Space Flight solar simulator.

#### B79-10060

##### DESIGN OF A CONCENTRATING SOLAR COLLECTOR

Innovator not given (Northrop, Inc.) Aug. 1979

M-FS-25098

Vol. 4, No. 1, p. 60

Design package for concentrating solar collector includes detailed set of design drawings and parts list for all components and subcomponents of system (including its tracking drive).

#### B79-10061

##### CONCENTRATING SOLAR COLLECTOR-PERFORMANCE TESTS

Innovator not given (Wyle Labs., Inc.) Aug. 1979 See also M-FS-25068 (B78-10500)

M-FS-25086

Vol. 4, No. 1, p. 60

Report summarizes test results from evaluation of concentrating solar collector thermal performance, from transient behavior,

and incident-of-angle behavior. Tests were conducted using National Bureau of Standards recommendations and specifications.

#### B79-10062

##### CONTROLLER FOR SOLAR HEATING-DESIGN PACKAGE

Innovator not given (Solar Control Corp.) Aug. 1979

M-FS-25009

Vol. 4, No. 1, p. 61

Report contains performance specifications and detailed drawings for two instruments: (1) differential controller, and (2) temperature monitor, for solar-powered water-heating systems. Included in package are schematics, wiring diagrams, test procedures, and parts list.

#### B79-10063

##### COST ANALYSIS OF HOT-AIR SOLAR-HEATING SYSTEMS

B. J. HAWKINS and R. D. STEWART

Aug. 1979

M-FS-25092

Vol. 4, No. 1, p. 61

Report describes results of study of two operational test sites (Huntsville, Alabama and Carlsbad, New Mexico) furnishing estimates of actual costs and potential cost savings of new and retrofit hot-air solar heating and hot-water system for single family dwellings.

#### B79-10064

##### SOLAR ENERGY FOR INDUSTRIAL PROCESS HEAT

R. H. BARBIERI and D. L. PIVIROTTO

Aug. 1979

NPO-14498

Vol. 4, No. 1, p. 62

Findings of study of potential use for solar energy utilization by California dairy industry prove that applicable solar energy systems furnish much of heat needed for milk processing with large savings in expenditures for oil and gas and ensurance of adequate readily available sources of process heat.

#### B79-10065

##### AN ANNOTATED ENERGY BIBLIOGRAPHY

S. J. BLOW

Aug. 1979 See also NASA-TM-74764 (N77-28578); NASA-TM-47465 (N77-28577)

LANGLEY-12488

Vol. 4, No. 1, p. 62

Comprehensive annotated compilation of books, journals, periodicals, and reports on energy and energy related topics, contains approximately 10,000 technical and nontechnical references from bibliographic and other sources dated January 1975 through May 1977.

#### B79-10066

##### ANALYSIS OF APERTURE ANTENNA RADIATION PATTERN

R. HERSKIND (AVCO Corp.), E. SAYRE (AVCO Corp.), J. E. TROUSDALE (AVCO Corp.), and J. YOS (AVCO Corp.)

Aug. 1979

MSC-16246

Vol. 4, No. 1, p. 63

Report presents analysis of radiation pattern produced by aperture antenna transmitting through layered dielectric material. Report also describes computer program developed to compute radiation patterns on basis of analysis.

#### B79-10067

##### ANALYSIS OF BUILDING HEATING AND COOLING

V. W. CHAI, S. HIGGINS, F. L. LANSING, F. W. STOLLER, and D. M. STRAIN

Aug. 1979

NPO-14683

Vol. 4, No. 1, p. 63

Energy Conservation Program (ECP) gives design engineer methodology and easy-to-use computer program for simulating hourly thermal characteristics over full year for individually characterized zones within building. Inexpensive system can be used to develop thermal model of building to aid selection of most suitable and economical heating and cooling system for building.

#### B79-10177

##### SINGLE-AXLE, DOUBLE-AXIS SOLAR TRACKER

L. W. BRANTLEY and B. D. LAWSON



Dec. 1979

**M-FS-23267 Vol. 4, No. 2, p. 197**

Solar concentrator tracking mechanism consisting of angular axle and two synchronized drive motors, follows seasonal as well as diurnal changes in Earth's orientation with respect to incoming sunlight.

**B79-10178****HIGH-PERFORMANCE SOLAR COLLECTOR**

D. C. BEEKLEY (Owens-Illinois, Inc.) and G. R. MATHER, JR. (Owens-Illinois, Inc.)

Dec. 1979

**M-FS-25135 Vol. 4, No. 2, p. 198**

Evacuated all-glass concentric tube collector using air or liquid transfer mediums is very efficient at high temperatures. Collector can directly drive existing heating systems that are presently driven by fossil fuel with relative ease of conversion and less expense than installation of complete solar heating systems.

**B79-10179****SIMPLE, ECONOMICAL SOLAR COLLECTOR**

K. ANTHONY

Dec. 1979 See also B78-10203

**M-FS-25109 Vol. 4, No. 2, p. 199**

Hot air solar collector designed for economy and simplicity is assembled from only three parts: (1) molded urethane foam body, (2) flat sheet metal collector panel and (3) transparent cover. Large arrays may be assembled by inserting male fittings of each collector into female fitting of adjacent collector.

**B79-10180****LIGHTWEIGHT, ECONOMICAL SOLAR CONCENTRATOR**

J. G. SIMPSON

Dec. 1979

**M-FS-23727 Vol. 4, No. 2, p. 200**

Concentrator consisting of aluminized polymeric film stretched over parallel tensioned wires that can be used with or without tracking drive promises to reduce cost of commercial and residential solar heating systems.

**B79-10181****POINTING ERRORS IN SOLAR DISH COLLECTORS**

R. O. HUGHES (Caltech)

Dec. 1979

**NPO-14630 Vol. 4, No. 2, p. 200**

Mathematical analysis calculates effects of transient pointing errors in solar dish collectors treating each pointing error separately. This approach considerably simplifies programming of simulation models for tracking drive, wind effects, and other design parameters.

**B79-10182****DIFFERENTIAL SPECTROPHONE**

J. S. MARGOLIS (Caltech)

Dec. 1979 See also B78-10167; B79-10040

**NPO-14599 Vol. 4, No. 2, p. 202**

Sensitivity and measuring capability of optoacoustic gas analyzer (spectrophone) are enhanced by combining differential monitoring stark modulation.

**B79-10183****LENS WINDOW SIMPLIFIES TDL HOUSING**

D. M. ROBINSON and C. W. ROWLAND

Dec. 1979

**LANGLEY-12437 Vol. 4, No. 2, p. 203**

Lens window seal in tunable-diode-laser housing replaces plan parallel window. Lens seals housing and acts as optical-output coupler, thus eliminating need for additional reimaging or collimating optics.

**B79-10184****FOCUSING LASER SCANNER**

W. R. CALLEN (Georgia Inst. of Technology) and J. E. WEAVER (Georgia Inst. of Technology)

Dec. 1979 See also NASA-CR-150810 (N78-31412)

**M-FS-25102****Vol. 4, No. 2, p. 204**

Economical laser scanner assembled from commercially available components, modulates and scans focused laser beam over area up to 5.1 by 5.1 cm. Scanner gives resolution comparable to that of conventional television. Device is highly applicable to area of analog and digital storage and retrieval.

**B79-10185****MULTIPLEXED MASS SPECTROMETER FOR DESORPTION STUDIES**

M. BALES (California Univ., Berkeley)

Dec. 1979

**ARC-11134 Vol. 4, No. 2, p. 205**

Microprocessor controlled mass spectrometer data acquisition system simultaneously monitors up to nine gaseous products emitted from heated substrate during thermal desorption experiments.

**B79-10186****PREIONIZED DISCHARGE FOR SHORT-WAVELENGTH LASER**

J. B. LAUDENSLAGER (Caltech) and T. J. PACALA (Caltech)

Dec. 1979 See also B75-10115

**NPO-13945 Vol. 4, No. 2, p. 206**

Laser uses helium and nitrogen gases at pressure of several atmospheres to produce emissions in visible and ultraviolet regions. Preionization of gases by transverse discharge insures that main discharge is glow instead of arc for proper charge transfer mechanism.

**B79-10187****IMPROVED TIME-OF-FLIGHT MASS SPECTROMETER**

K. A. LINCOLN

Dec. 1979

**ARC-11090 Vol. 4, No. 2, p. 207**

External signal-conditioning electronics assembled from commercially available components improves dynamic capability of time-of-flight mass spectrometer.

**B79-10188****DEGASSING PROCEDURE FOR ULTRAHIGH VACUUM**

B. C. MOORE (McDonnell Douglas Corp.)

Dec. 1979

**M-FS-25103 Vol. 4, No. 2, p. 208**

Calculations based on diffusion coefficients and degassing rates for stainless-steel vacuum chambers indicate that baking at lower temperatures for longer periods give lower ultimate pressures than rapid baking at high temperatures. Process could reduce pressures in chambers for particle accelerators, fusion reactors, material research, and other applications.

**B79-10189****PERFORMANCE EVALUATION OF A LIQUID SOLAR COLLECTOR**

Innovator not given (Wyle Laboratories) Dec. 1979

**M-FS-25026 Vol. 4, No. 2, p. 209**

Report describes thermal performance and structural-load tests on commercial single glazed flat-plate solar collector with gross area of 63.5 sq ft that uses water as heat-transfer medium. Report documents test instrumentation and procedures and presents data as tables and graphs. Results are analyzed by standard data-reduction methods.

**B79-10190****DESIGN AND INSTALLATION OF A SOLAR-POWERED HOT-WATER SYSTEM**

Innovator not given (Solar Engineering & Manufacturing Co.) Dec. 1979

**M-FS-25080 Vol. 4, No. 2, p. 209**

Package includes performance specifications, design drawings, hazard analysis, and installation for complete solar-powered hot-water system.

**B79-10191****THE DESIGN OF SOLAR-HEATING SYSTEMS**

Innovator not given (Honeywell, Inc.) Dec. 1979

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**M-FS-25108****Vol. 4, No. 2, p. 209**

Report describes organized approach to design of solar-heating systems. Such parameters as collector area, storage capacity, hardware, and constraints are determined and complete cost-and-performance analysis are made. Report provides practical example by tracing development of several systems sized for single family, multifamily, and commercial buildings in Minneapolis area.

**B79-10192****THE DESIGN OF SOLAR-HEATING AND COOLING SYSTEMS**

Innovator not given (Honeywell, Inc.) Dec. 1979

**M-FS-25106****Vol. 4, No. 2, p. 210**

Methods described in report were used to develop specifications for Rankine-cycle solar heating and cooling systems for single family, multifamily, and commercial buildings.

**B79-10193****DESIGN PACKAGE FOR A SOLAR-HEATING SYSTEM**

Innovator not given (IBM Corp.) Dec. 1979 See also B78-10492; B78-10493

**M-FS-25136****Vol. 4, No. 2, p. 210**

Report contains sufficient information to assemble complete tested residential flat-plate solar heating system. Descriptive material provides design, performance, and hardware specifications for utilization by architectural engineers, and contractors in procurement, installation, operation, and maintenance of similar solar applications.

**B79-10194****PERFORMANCE AFTER WEATHERING OF A LIQUID SOLAR COLLECTOR**

Innovator not given (Wyle Laboratories) Dec. 1979 See also B78-10206

**M-FS-25137****Vol. 4, No. 2, p. 211**

Results from retesting of liquid solar collector described in 'Performance evaluation of liquid collector' (M-FS-23931), after long term exposure to natural weathering indicate no detectable degradation in collector performance and no visible deterioration in appearance of collector. Supporting data and pretest/post test efficiency comparison are included.

**B79-10195****MODULAR SOLAR-HEATING SYSTEM - DESIGN PACKAGE**

D. S. SINTON (IBM Corp.) Dec. 1979 See also B78-10494

**M-FS-25130****Vol. 4, No. 2, p. 211**

Compilation contains design, performance, and hardware specifications in sufficient detail to fabricate or procure materials and install, operate, and maintain complete modular solar heating and hot water system for single family size dwellings.

**B79-10196****CONCENTRIC-TUBE SOLAR COLLECTOR**

Innovator not given (Owens-Illinois) Dec. 1979 See also B79-10056

**M-FS-25133****Vol. 4, No. 2, p. 211**

Brochure contains design, performance, and installation information for commercial concentric-tube solar collector.

**B79-10197****PERFORMANCE VERIFICATION OF AN AIR SOLAR COLLECTOR**

D. C. MILLER (Owens-Illinois) and R. F. ROMAKER (Owens-Illinois) Dec. 1979 See also B79-10056

**M-FS-25131****Vol. 4, No. 2, p. 212**

Procedures and results of battery of qualification tests performed by independent certification agency on commercial solar collector are presented in report. Reported results were used as basis in judging collector suitable for field installation in residential and commercial buildings.

**B79-10198****PRELIMINARY DESIGN OF AN AIR SOLAR COLLECTOR**

Innovator not given (Owens-Illinois) Dec. 1979

**M-FS-25138****Vol. 4, No. 2, p. 212**

Report containing performance specifications and engineering drawings of concentric-tube air solar collector show details of collector and subcomponents that indicate efficiency surpassing predetermined performance baseline for air collectors.

**B79-10199****DESIGN REVIEW OF A LIQUID SOLAR COLLECTOR**

B. L. WIESEWMAIER

Dec. 1979

**M-FS-25140****Vol. 4, No. 2, p. 212**

Report documents procedures, results, and recommendations for in-depth analysis of problems with liquid-filled version of concentric-tube solar collector. Problems are related to loss of vacuum and/or violent fracture of collector elements, fluid leakage, freezing, flow anomalies, manifold damage, and other component failures.

**B79-10200****DEVELOPMENT OF NONMETALLIC SOLAR COLLECTOR AND SOLAR-POWERED PUMP**

J. C. PARKER

Dec. 1979 See also B78-10498; B78-10499; B79-10033

**M-FS-25143****Vol. 4, No. 2, p. 213**

Design and building of two unique components for solar heating 1. flatplate solar collector using no metal components, and 2. solar powered pump for heating and cooling systems are outlined in report. Report also discusses hardware, deliverable end items, problems encountered during fabrication and testing, and performance certification.

**B79-10201****CERTIFICATION TESTS ON THE SOLAR-POWERED PUMP**

Innovator not given (Calmac Manufacturing Co.) Dec. 1979 See also B79-10200

**M-FS-25144****Vol. 4, No. 2, p. 213**

Evaluation of solar-powered pump is given. Details cover fifty performance criterion along with summary of findings.

**B79-10202****COST-REDUCTION ANALYSIS FOR A SOLAR-HEATING SYSTEM**

W. L. REID (Alabama Univ.) and R. E. SHANNON (Alabama Univ.)

Dec. 1979 See also B79-10063

**M-FS-25152****Vol. 4, No. 2, p. 213**

Details on solar-heating system installed in Huntsville, Alabama are presented. Estimated cost savings and recommendations for system are proposed.

**B79-10203****REMOTE-SENSING APPLICATIONS TO GEOLOGY**

Innovator not given (University of Tennessee Space Institute) Dec. 1979

**M-FS-25151****Vol. 4, No. 2, p. 214**

Results of two day workshop on applications of remote sensing to geology are summarized in report. Topics discussed are environmental analysis, crop classification, plant epidemics and diseases, irrigation reform, and soil surveys.

**B79-10204****COMPUTER ANALYSIS OF LANDSAT DATA**

R. R. JAYROE, JR.

Dec. 1979 See also NASA-TM-78184 (N78-30634)

**M-FS-25105****Vol. 4, No. 2, p. 214**

Report summarizing possible ways of improving LANDSAT data provided by computers is presented.

**B79-10205****SKYMAP STAR CATALOG**

D. GOTTLIEB (Computer Science Corp.)

Dec. 1979

**GSFC-12445****Vol. 4, No. 2, p. 215**

Skymap data and data-handling programs for 255,000 stars are discussed. Data should prove useful to astronomers, spacecraft

designers, and others who have need for comprehensive star catalog.

**B79-10206****METEOROLOGICAL DATA-PROCESSING PACKAGE**

J. B. BILLINGSLEY and P. A. BRAKEN

Dec. 1979

**GSFC-12372**

**Vol. 4, No. 2, p. 215**

METPAK, meteorological data-processing package of satellite data used to develop cloud-tracking maps, is given. Data can develop and enhance numerical prediction models for mesoscale phenomena and improve ability to detect and predict storms.

**B79-10207****AOIPS CLASSIFICATION PACKAGE**

J. B. BILLINGSLEY and P. A. BRAKEN

Dec. 1979

**GSFC-12374**

**Vol. 4, No. 2, p. 216**

CLASSPAK, interactive program for classifying multispectral data, is presented. Program is applicable in land-cover studies, forestry and agriculture investigations, and also for watershed studies.

**B79-10325****TRANSMITTER/RECEIVER FOR LASER IMAGING**

P. G. HASELL, JR. (Environmental Research Institute of Michigan), L. M. LARSEN (Environmental Research Institute of Michigan), and E. A. WORK (Bureau of Land Management)

Apr. 1980 See also NASA-CR-151461 (N77-27485)

**MSC-18196**

**Vol. 4, No. 3, p. 351**

Dual-mirror transmitter and receiver combination is used with laser multispectral imaging system carried by low fly aircraft. Device can be arranged to reduce laser light backscatter which creates false light levels in recorded image and compensates for scanning phase delay between transmitter and receiver.

**B79-10326****FABRICATING WEDGE-SHAPED BEAM SPLITTERS**

C. M. FLEETWOOD, JR. and S. H. RICE

Apr. 1980

**GSFC-12348**

**Vol. 4, No. 3, p. 352**

Fast economical fabrication produces wedge-shaped beam splitter with 0.3 micrometer edge, compared to conventional methods that have yielded 2 micrometer edges. Typical beam splitter made by new process is prism-shaped with right-triangle cross-section.

**B79-10327****FIELD-FLATTENER LENS**

F. VICIK (Barnes Engineering Co.)

Apr. 1980 See also NASA-CR-151753 (N78-29424)

**MSC-18373**

**Vol. 4, No. 3, p. 353**

Proposed spherical lens employs image flattening reflective surface within spherical refracting elements to focus light to flat image. Device is intended for use as optical scanner for silicon light detector. Lens can scan wide angle at low F-stops, producing high-resolution image over angle of wavelengths from 0.4 to 14 micrometers.

**B79-10328****HIGH-RESOLUTION SPECTROMETER**

R. BEER (Caltech)

Apr. 1980

**NPO-14372**

**Vol. 4, No. 3, p. 354**

Proposed spectrometer combines optical and imaging devices and cryogenic cooling to measure infrared radiation in 1-to-15 micrometer wavelength range with spatial resolution of 1 arc-second and average spectral resolution of about 0.1 cm<sup>-1</sup>. Compact, lightweight unit is suitable for laboratory or field use. Pollution monitoring is possible application.

**B79-10329****LIQUID/LIQUID HEAT EXCHANGER**

C. G. MILLER (Caltech)

Apr. 1980

**NPO-14271**

**Vol. 4, No. 3, p. 355**

Conceptual design for heat exchanger, utilizing two immiscible liquids with dissimilar specific gravities in direct contact, is more efficient mechanism of heat transfer than conventional heat exchangers with walls or membranes. Concept could be adapted for collection of heat from solar or geothermal sources.

**B79-10330****NO-REHEAT AIR-CONDITIONING**

H. D. OBLER

Apr. 1980

**GSFC-12191**

**Vol. 4, No. 3, p. 356**

Air conditioning system, for environmentally controlled areas containing sensitive equipment, regulates temperature and humidity without wasteful and costly reheating. System blends outside air with return air as dictated by various sensors to ensure required humidity in cooled spaces (such as computer room).

**B79-10331****IMPROVING MASER FREQUENCY STABILITY**

S. B. CRAMPTON (Williams College)

Apr. 1980

**GSFC-12400**

**Vol. 4, No. 3, p. 357**

Hydrogen maser frequency standard is more stable by addition of parallel pyrex capillary tube array collimator. With collimator, maser line width has been made as narrow as 0.24 hertz representing fivefold improvement over maser without collimator. Fluorocarbon coating in tubes virtually eliminates energy loss in collimator.

**B79-10332****ROTATABLE MICROSCOPE STAGE**

J. A. IVANISKO (Sperry Rand Corp.)

Apr. 1980

**MSC-18549**

**Vol. 4, No. 3, p. 358**

Samples mounted on rotatable microscope stage consisting of aluminum hemisphere resting in hemispherical cavity of polytetrafluoroethylene base is viewed at various angles. Stage permits operator to orient sample at selected fixed angles.

**B79-10333****MICROWAVE MEASUREMENT OF ATMOSPHERIC PRESSURE**

D. A. FLOWER (Caltech) and G. E. PECKHAM (Heriot-Watt University)

Apr. 1980

**NPO-14450**

**Vol. 4, No. 3, p. 358**

Proposed concept for measuring surface air pressure over ocean utilizes three pairs of microwave signals transmitted from orbiting satellite. Measurements are used for long range weather forecasting.

**B79-10334****ALL-GLASS SOLAR COLLECTOR**

J. P. WISNEWSKI (PPG Industries, Inc.)

Apr. 1980

**M-FS-23870**

**Vol. 4, No. 3, p. 359**

Proposed all tempered glass solar collector uses black collection fluid and mirrored bottom to reduce energy loss and overall costs associated with conventional collectors. Collector is more efficient and practically maintenance-free.

**B79-10335****SOLAR-HEATING SYSTEM DESIGN PACKAGE**

Innovator not given (Contemporary Systems, Inc.) Apr. 1980

**M-FS-25226**

**Vol. 4, No. 3, p. 360**

Report describes solar heating system composed of warm-air solar collector, logic control unit, and switching and transport unit, that meets government standards for installation in residential dwellings. Text describes system operation and performance specifications complemented by comprehensive set of subcomponent design drawings.

**B79-10336****TEST AND EVALUATION OF A SOLAR-HEATING SYSTEM**

### 03 PHYSICAL SCIENCES

Innovator not given (Fern Engineering Co., Inc.) Apr. 1980

**M-FS-25201** Vol. 4, No. 3, p. 360

Report documents results of evaluation tests performed on components of commercial solar heating and hot water system. Subsystems tested include flat plate solar collector, energy transport module, and control panel. Tests conducted include snow and wind loads, flame spread, and smoke classification as well as solar heating operation.

**B79-10337**

#### **INSTALLATION PACKAGE FOR A SOLAR-HEATING SYSTEM**

Innovator not given (Solaron Corp.) Apr. 1980

**M-FS-25198** Vol. 4, No. 3, p. 360

Package consists of installation, operation and maintenance manuals for four commercial solar energy subsystems, including flat plate solar collector pebble bed thermal-storage. Manual gives design information, sizing data, specification drawings, and other material for subsystem.

**B79-10338**

#### **VERIFICATION TESTS FOR A SOLAR-HEATING SYSTEM**

Innovator not given (Colt, Inc.) Apr. 1980

**M-FS-25178** Vol. 4, No. 3, p. 361

Report describes method of verification of solar space heating and hot-water systems using similarity comparison, mathematical analysis, inspections, and tests. Systems, subsystems, and components were tested for performance, durability, safety, and other factors. Tables and graphs complement test materials.

**B79-10339**

#### **RESIDENTIAL SOLAR-HEATING/COOLING SYSTEM**

Innovator not given (Energy Resources Center of Honeywell, Inc.) Apr. 1980 See also B79-10192

**M-FS-25166** Vol. 4, No. 3, p. 361

Report documents progress of residential solar-heating and cooling system development program at 5-month mark of anticipated 17-month program. System design has been completed, and development and component testing has been initiated. Report includes diagrams, operation overview, optimization studies of subcomponents, and marketing plans for system.

**B79-10340**

#### **INSTALLATION PACKAGE FOR A SOLAR-HEATING SYSTEM**

Innovator not given (Solar Engineering and Equipment Co., Inc.) Apr. 1980

**M-FS-25157** Vol. 4, No. 3, p. 361

Installation package for solar-powered hot-air system contains such information as operation and maintenance manuals, hardware brochures, schematics, operating mode descriptions, and drawings.

**B79-10341**

#### **LIQUID SOLAR COLLECTOR**

Innovator not given (Florida Solar Energy Center) Apr. 1980

**M-FS-25218** Vol. 4, No. 3, p. 362

Report documents evaluation test on commercial flat-plate solar collector that uses water as working fluid. Performance was measured before and after 34-day exposure to natural environment. Tables in metric and English units present data on air and water temperatures, waterflow, insolation, efficiency, and windspeed and direction.

**B79-10342**

#### **FINAL REPORT ON THE CONCENTRIC-TUBE SOLAR COLLECTOR**

J. C. PARKER

Apr. 1980 See also B79-10178; B79-10199

**M-FS-25188** Vol. 4, No. 3, p. 362

Report documents 26-month program to optimize performance of commercial high performance concentric tube solar collector. Report discusses program objectives, accomplishments, encountered problems, and final hardware. Certification test results are also included.

**B79-10343**

#### **COLLECTOR PERFORMANCE AT VARIOUS AIR-CHANNEL DEPTHS**

Innovator not given (Wyle Laboratories) Apr. 1980

**M-FS-25159** Vol. 4, No. 3, p. 362

Report describes evaluation of solar collector efficiency which was measured at airflow channel depths of 3, 2, 1, and 1/2 inches in solar simulator. Data were also recorded on absorber surface temperature, inlet and outlet temperatures, airflow and insolation rates, collector differential pressure and windspeed, for result tabulation and plotting.

**B79-10344**

#### **FIN-TUBE SOLAR COLLECTORS**

Innovator not given (Wyle Laboratories) Apr. 1980

**M-FS-25238** Vol. 4, No. 3, p. 362

Report presents test procedures and results of thermal-performance evaluation of seven commercial fin tube (liquid) solar collector-absorber plates. Tests were conducted indoors at Marshall Space Flight Center Solar simulator. Results are graphically shown along with supporting test data and summary, indicating efficiency as function of collector inlet temperature.

**B79-10345**

#### **CERTIFICATION OF THE CONCENTRATING SOLAR COLLECTOR**

Innovator not given (Northrup, Inc.) Apr. 1980

**M-FS-25220** Vol. 4, No. 3, p. 363

Report describes procedures and results of extensive testing of concentrating solar collector performed for certification of systems compliance with government performance standards. Test includes operational, electrical, mechanical, and thermal checks, as well as structural integrity.

**B79-10346**

#### **COLLECTOR PERFORMANCE AFTER WEATHERING**

Innovator not given (Solar Energy Systems Div. of Wyle Laboratories) Apr. 1980 See also B78-10204

**M-FS-25187** Vol. 4, No. 3, p. 363

Method drastically reduces preparation time of pentaerythritol diformal (2, 4, 8, 10-tetroxaspiro (5.5) undecane) from several hours to time span of 3 to 20 minutes with yields greater than 90 percent. Other advantages include elimination of solvents, decrease in labor and energy needs, adaptability to continuous operations, and overall simplicity and convenience.

**B79-10347**

#### **CONCENTRATING SOLAR COLLECTOR - FINAL DESIGN**

J. C. PARKER

Apr. 1980 See also B78-10500

**M-FS-25186** Vol. 4, No. 3, p. 363

Final report of program to improve commercially available concentrating solar collector describes final hardware, discusses problems encountered, and presents certification statements, photographs, and recommendations for modification.

**B79-10348**

#### **WEATHERING OF A FLAT-PLATE SOLAR COLLECTOR**

Innovator not given (Wyle Laboratories) Apr. 1980

**M-FS-25160** Vol. 4, No. 3, p. 364

Report contains performance evaluation of flat-plate liquid solar collector after 14-months of natural weathering. Collector efficiency was calculated and plotted as function of inlet liquid temperature. Measurements were made of ambient temperature, inlet and outlet temperatures, differential temperature and pressure, liquid flow rate, insolation, and windspeed.

**B79-10349**

#### **GUIDE TO REMOTE-SENSOR DATA SYSTEMS**

R. R. DEWITT (New Tech., Inc.) and J. L. ELLISON (New Tech., Inc.)

Apr. 1980 See also NASA-CR-150837 (N79-14499)

**M-FS-25169** Vol. 4, No. 3, p. 364

Remote sensing data-handbook presents theoretical and practical information on spaceborne sensors and associated systems for Earth-resources applications. Handbook provides

discussion on historical information, principles of operations, factors affecting performances, nature of data output, and system required to process data and trends in research and development.

**B79-10350**

**SOLAR INSOLATION MODEL**

J. H. SMITH (Caltech)

Apr. 1980

**NPO-14787**

**Vol. 4, No. 3, p. 365**

Computer program SOLINS helps engineers with relatively complex task of choosing best orientation of fixed flat-plate solar collectors for local conditions. Program models average hourly solar insolation on fixed but arbitrarily-oriented surface. Consideration is given to problems of array spacing, shadowing, and use of augmentation reflectors to increase insolation at collector surface.

**B79-10351**

**GENERAL OPTICS EVALUATION PROGRAM**

B. J. HOWELL

Apr. 1980

**GSFC-12439**

**Vol. 4, No. 3, p. 365**

Computer program GENOPTICS is generalized aid for analysis and evaluation of optical systems that employ lenses, mirrors, diffraction gratings, and other geometrical optical surfaces. It can exactly trace up to 800 rays through as many as 40 surfaces. Results can be used to compute third order aberration coefficients including spheric contributions.

**B79-10352**

**THERMODYNAMIC AND TRANSPORT PROPERTIES OF FLUIDS**

T. E. FESSLER

Apr. 1980

**LEWIS-13127**

**Vol. 4, No. 3, p. 365**

Computer program subroutine FLUID calculates thermodynamic and transport properties of pure fluids in liquid, gas, or two-phase (liquid/gas) conditions. Program determines thermodynamic state from assigned values for temperature and density, pressure and density, temperature and pressure, pressure and entropy, or pressure and enthalpy.

**B79-10481**

**NUCLEAR ELECTRO-OPTIC POWER**

J. J. SINGH

Jun. 1980 See also NASA-TM-78789 (N78-33538)

**LANGLEY-12496**

**Vol. 4, No. 4, p. 487**

Tertiary-nuclear power cell utilizes alpha source from which radiated particles strike phosphors which in turn emit photons that are converted to electricity by solar cell. Experiments indicated that device is capable of providing sufficient power for numerous electronic applications where reliability and long life are important.

**B79-10482**

**PROPOSED JOSEPHSON VOLTAGE STANDARD**

C. C. CHANG (U.S. Dept. of Commerce), L. B. HOLDERMAN (U.S. Dept. of Commerce), and J. TOOTS (U.S. Dept. of Commerce)

Jun. 1980

**M-FS-23845**

**Vol. 4, No. 4, p. 488**

Relatively-simple microwave integrated circuit comprising two resonators linked by Josephson junction could be set up to generate standard Josephson volt in any industrial laboratory. Standard cells and electronic equipment could be readily compared and calibrated to this standard.

**B79-10483**

**HIGH-EFFICIENCY WIND TURBINE**

L. A. HEIN and W. N. MYERS

Jun. 1980

**M-FS-23830**

**Vol. 4, No. 4, p. 489**

Vertical axis wind turbine incorporates several unique features to extract more energy from wind increasing efficiency 20% over conventional propeller driven units. System also features devices that utilize solar energy or chimney effluents during periods of no wind.

**B79-10484**

**INCREASED FUEL-CELL CROSS-PRESSURE LIMIT**

W. F. BELL (United Technologies Corp.) and N. J. MAIO (United Technologies Corp.)

Jun. 1980

**M-FS-25196**

**Vol. 4, No. 4, p. 490**

Polytetrafluoroethylene (PTFE) impregnated support screen increases cross pressure on electrolyte-filled matrix in fuel-cell passive water-removed unit. This increases cell operating pressure limit which may improve performance and life characteristics of passive water-removal-type fuel cells.

**B79-10485**

**MEASURING TRANSMISSIVITY OF SOLAR-CELL COVERS**

E. G. LAUE (Caltech)

Jun. 1980

**NPO-14638**

**Vol. 4, No. 4, p. 490**

Apparatus uses simulated solar point source refracted by condensing lens to determine ratio of transmissivity of solar cell cover material to that of standard reference specimen.

**B79-10486**

**IMPROVED DEGRADATION RESISTANCE OF (ALGA)AS LASERS**

H. KRESSEL (RCA Corp.) and J. LADANY (RCA Corp.)

Jun. 1980 See also NASA-CR-3045 (N78-32405)

**LANGLEY-12242**

**Vol. 4, No. 4, p. 491**

Simultaneous doping with Ge and Zn improves degradation resistance of short-wavelength (AlGa)As lasers. Method opens up prospects for greatly increased reliability in lasers and LED's operating at 7,500 angstroms or below.

**B79-10487**

**IMPROVED VAPOR-GROWTH TECHNIQUE FOR III-V COMPOUND LASERS**

C. J. BUJOCCHI (RCA Corp.), G. H. OLSEN (RCA Corp.), and T. J. ZAMEROWSKI (RCA Corp.)

Jun. 1980

**LANGLEY-12255**

**Vol. 4, No. 4, p. 492**

Vapor Growth technique of multilayered semiconductor devices based on elements in groups 3, 4, and 5 such as transmission photo cathodes and heterojunction lasers, reduces thermal decomposition and improves performance. In addition technique allows fabrication of GaP/GaAsP/InGaP, visible CW lasers through reduction of thermal decomposition.

**B79-10488**

**GERMANIUM-ON-INP HETEROJUNCTION-STRUCTURE LED**

F. Z. HAWRYLO (RCA Corp.)

Jun. 1980

**LANGLEY-12349**

**Vol. 4, No. 4, p. 492**

Ge-on-InP heterojunction structure LED has been developed where in Ge film is evaporated onto commercially available InP substrate. Forward bias of device is approximately 1 volt, and it emits light in 9.800 angstrom region. Technique permits easy and inexpensive fabrication of LED for application at this wavelength.

**B79-10489**

**IMPROVED THERMAL-CONDUCTING AND CURRENT-CONFINING FILM**

F. Z. HAWRYLO (RCA Corp.)

Jun. 1980

**LANGLEY-12350**

**Vol. 4, No. 4, p. 493**

Ge film that replaces SiO<sub>2</sub> coating in method of fabricating room-temperature CW laser diodes achieves greater heat dissipation while maintaining effectiveness as current-confining medium. Film also lessens certain unwanted strain parameters and ultimately increases lifetime of lasers. Method is applicable to fabrication of InP and (AlGa)As CW lasers.

**B79-10490**

**OHMIC CONTACT TO P-TYPE INDIUM PHOSPHIDE**

F. Z. HAWRYLO (RCA Corp.)

Jun. 1980

## 03 PHYSICAL SCIENCES

### LANGLEY-12351

Vol. 4, No. 4, p. 494

Low-Series-resistance ohmic contact to p-type InP semiconductor material is achieved in technique utilizing Au-Ge-Zn eutectic alloy. Alloy sets and adheres well to semiconductor surface with higher acceptor concentration at metal semiconductor interface. Technique has proved satisfactory for pn junction LED's and lasers.

### B79-10491

#### CDINP SEMICONDUCTOR ALLOY

F. Z. HAWRYLO (RCA Corp.)

Jun. 1980

### LANGLEY-12405

Vol. 4, No. 4, p. 494

Semiconductor alloy of CdSInP deposited onto CdS substrate using liquid-phase epitaxy (LPE) employed in solvent is replacement for InP n- and p-type heterojunction layers contained in GaAsp laser devices. Alloy will aid in lowering current density of laser and enhance its longevity and CW operation at room temperature.

### B79-10492

#### SEALED HIGH-PRESSURE X-RAY DETECTOR

P. GORENSTEIN (Smithsonian Astrophysical Observatory)

Jun. 1980

### GSFC-12519

Vol. 4, No. 4, p. 495

Detector is filled to pressure of 2 atm with mixture of 95% xenon and 5% methane for recording hard X-ray (50-to100-keV) images with spatial resolution of about 1 mm. Being sealed, detector requires no gas purification or replenishment after initial fill. Potential areas of application include nuclear medicine, and X-ray or gamma-ray astronomy.

### B79-10493

#### AUTOMATICALLY CLASSIFYING EARTH FEATURES FROM ORBIT

R. L. HOLSTROM (Martin Marietta Corp.), R. T. SCHAPPELL (Martin Marietta Corp.), and J. C. TIETZ (Martin Marietta Corp.)

Jun. 1980 See also NASA-CR-158997 (N79-16339)

### LANGLEY-12589

Vol. 4, No. 4, p. 496

Solid state circuit classifies satellite imagery by spectral signature of vegetation, bare land, water, clouds, or snow. Circuit can be used to sort and separate specific imagery by signature so that only useful data is transmitted to Earth. Device saves time and costs involved in manual separation of data.

### B79-10494

#### FEP PLUG PROTECTS H2 MASERS

J. J. DELUCA and V. S. REINHARDT

Jun. 1980

### GSFC-12552

Vol. 4, No. 4, p. 497

Lifetime of hydrogen-maser bulb is increased by replacing beam stop plate with thick fluorinated ethylene-propylene (FEP) plug inserted in hole opposite beam entrance stem of bulb.

### B79-10495

#### PROGRAMABLE SOLAR-ENERGY CONTROLLER

Innovator not given (Sunkeeper Control Corp.) Jun. 1980

### M-FS-25189

Vol. 4, No. 4, p. 497

Report characterizes commercially developed solar-energy control IPECH (integrated programmable electronic controller and hydronic) subsystem, giving information used in evaluating its performance.

### B79-10496

#### WEATHERING OF A LIQUID SOLAR COLLECTOR

Innovator not given (Solar Energy System Division of Wyle Laboratories) Jun. 1980

### M-FS-25300

Vol. 4, No. 4, p. 498

Commercially available flat plate hot water solar collector is characterized in report that presents 10 month weathering study of system. Collector efficiency was calculated and plotted from measurements of fluid temperature and flow rate, ambient temperature and solar flux. Windspeed and wind direction were also measured during tests.

### B79-10497

#### TESTING OF A SOLAR COLLECTOR WITH CONCENTRATING MIRRORS

Innovator not given (Solar Energy Systems Division of Wyle Laboratories) Jun. 1980

### M-FS-25310

Vol. 4, No. 4, p. 498

Commercial flat-plate solar collector with concentrating mirrors has been tested for thermal performance, structured behavior under static load, and effects of long-term natural weathering. Report documents results of testing and concludes that absorptivity was degraded by weathering.

### B79-10498

#### INSTALLATION PACKAGE - HOME SOLAR HEATER

Innovator not given (Contemporary Systems, Inc.) Jun. 1980

### M-FS-25338

Vol. 4, No. 4 p. 498

Installation of commercial solar-heating system at two story, three bedroom house in New Hampshire is described in 65 page report. System collectors are integrated part of building replacing conventional roofing or siding. Report also includes general description of system, its operation and guidelines, orientation and references.

### B79-10499

#### MONTE CARLO VARIANCE REDUCTION

N. R. BYRN (Science Applications, Inc.)

Jun. 1980

### M-FS-23645

Vol. 4, No. 4, p. 499

Computer program incorporates technique that reduces variance of forward Monte Carlo method for given amount of computer time in determining radiation environment in complex organic and inorganic systems exposed to significant amounts of radiation.

### B79-10500

#### WIND-ENERGY STORAGE

L. H. GORDON

Jun. 1980 See also NASA-CR-135283 (N78-20802); NASA-CR-135284 (N78-20803); NASA-CR-135285 (N78-20804)

### LEWIS-13097

Vol. 4, No. 4, p. 499

Program SIMWEST can model wind energy storage system using any combination of five types of storage: pumped hydro, battery, thermal, flywheel, and pneumatic. Program is tool to aid design of optional system for given application with realistic simulation for further evaluation and verification.

### B79-10501

#### LANDSAT SIGNATURE DEVELOPMENT PROGRAM

R. A. BLAND

Jun. 1980

### KSC-11113

Vol. 4, No. 4, p. 500

LANDSAT signature development program (LSDP) automatically produces unsupervised classification of scene from LANDSAT data tape. Program is effective enough to be useful to sophisticated remote sensing analyst yet is simple enough to be utilized by ground truth investigators who have only basic understanding of computer and remote sensing procedures.

## 04 MATERIALS

### B79-10068

#### 'SELF-PACKAGING' DESICCANT

R. F. FEDORS

Aug. 1979

### NPO-14354

Vol. 4, No. 1, p. 67

Desiccant, consisting of water-soluble filler contained in water-permeable elastomeric matrix, absorbs large quantities of water without becoming sticky or releasing corrosive agents.

Desiccant may be molded into virtually any shape depending on area of application.

**B79-10069****IRRADIATION PRETREATMENT FOR COAL DESULFURIZATION**

G. C. HSU

Aug. 1979

**NPO-14104**

Vol. 4, No. 1, p. 68

Process using highly-penetrating nuclear radiation (Beta and Gamma radiation) from nuclear power plant radioactive waste to irradiate coal prior to conventional desulfurization procedures increases total extraction of sulfur.

**B79-10070****FLUIDIZED COAL COMBUSTION**

P. I. MOYNIHAN and D. L. YOUNG

Aug. 1979

**NPO-14273**

Vol. 4, No. 1, p. 69

Fluidized-bed coal combustion process, in which pulverized coal and limestone are burned in presence of forced air, may lead to efficient, reliable boilers with low sulfur dioxide and nitrogen dioxide emissions.

**B79-10071****SODA ASH REMOVES SULFUR FROM FUELS**

J. DOOHER (Adelphi Univ.), S. MOON (Adelphi Univ.), and D. WRIGHT (Adelphi Univ.)

Aug. 1979

**GSFC-12403**

Vol. 4, No. 1, p. 69

Test shows that adding soda ash (sodium bicarbonate) to coal/oil/water emulsion reduces 75 to 80% of sulfur dioxide gas emitted during subsequent combustion of emulsion.

**B79-10072****A CONTINUOUS SILICON-COATING FACILITY**

C. BUTTER (Honeywell, Inc.) and J. D. HEAPS (Honeywell, Inc.)

Aug. 1979

**NPO-14373**

Vol. 4, No. 1, p. 70

Automatic continuous silicon-coating facility is used to process 100 by 10 cm graphite-coated ceramic substrates for silicon solar cells. Process reduces contamination associated with conventional dip-coating processes, improving material service life.

**B79-10073****SILICON TETRACHLORIDE SPRAY FEEDER**

T. N. MEYER (Westinghouse Electric Corp.) and C. B. WOLF (Westinghouse Electric Corp.)

Aug. 1979

**NPO-14382**

Vol. 4, No. 1, p. 71

Silicon tetrachloride spray feeder mechanism is incorporated into high-temperature reactor for production of highly pure silicon intended for solar cells. Feeder supplies silicon tetrachloride as liquid droplets that rapidly vaporize in high temperature (2,000 to 2,200 K) reactor zone.

**B79-10074****A REACTOR FOR MORE EFFICIENT SOLAR CELLS**

M. G. FEY (Westinghouse Electric Corp.), T. N. MEYER (Westinghouse Electric Corp.), and C. B. WOLF (Westinghouse Electric Corp.)

Aug. 1979

**NPO-14381**

Vol. 4, No. 1, p. 72

Reactor produces highly pure silicon at relatively high temperature of 2,000 K. Process separates liquid silicon product from gaseous coproducts more easily than conventional lower-temperature processes. High production rates may be obtained in relatively small reaction chambers which could include means for collecting or casting silicon ingots.

**B79-10075****CHEMICAL-VAPOR-DEPOSITION REACTOR**

S. CHERN

Aug. 1979

**NPO-14137**

Vol. 4, No. 1, p. 73

Reactor utilizes multiple stacked trays compactly arranged in paths of horizontally channeled reactant gas streams. Design allows faster and more efficient deposits of film on substrates, and reduces gas and energy consumption. Lack of dead spots that trap reactive gases reduces reactor purge time.

**B79-10076****SILICON SOURCE FOR VACUUM DEPOSITION**

G. W. RACETTE (General Electric Co.) and D. J. RUTECKI (General Electric Co.)

Aug. 1979

**LANGLEY-12356**

Vol. 4, No. 1, p. 74

Device using two independent silicon sources for ultra-high-vacuum deposition on large substrates can deposit P and N types of silicon simultaneously. Efficient water cooled copper shield supports and cools structure and isolates two filaments.

**B79-10077****LOW ABSORPTANCE PORCELAIN-ON-ALUMINUM COATING**

H. LEGGETT

Aug. 1979

**M-FS-23879**

Vol. 4, No. 1, p. 75

Porcelain thermal-control coating for aluminum sheet and foil has solar absorptance of 0.22. Specially formulated coating absorptance is highly stable, changing only 0.03 after 1,000 hours of exposure to simulated sunlight and can be applied by standard commercial methods.

**B79-10078****BURNING CRUDE OIL WITHOUT POLLUTION**

J. HOUSEMAN

Aug. 1979

**NPO-14344**

Vol. 4, No. 1, p. 76

Crude oil can be burned at drilling sites by two-stage combustion process without producing pollution. Process allows easier conformance to strict federal or state clean air standards without installation of costly pollution removal equipment. Secondary oil recovery can be accomplished with injection of steam heating by burning oil.

**B79-10079****CONTINUOUS STERILIZATION OF PLUMBING SYSTEMS**

C. J. BRYAN, C. V. MOYERS, and E. E. WRIGHT, JR.

Aug. 1979

**KSC-11085**

Vol. 4, No. 1, p. 77

Continuous sterilization of plumbing, such as in hospitals, clinics, and biological testing laboratories is possible with ethylene oxide/Freon 12 (ETO/F-12) humidifier developed for sterilization of potable water systems.

**B79-10080****CONTROLLED METAL-FILM DEPOSITION ON ALUMINA SUBSTRATES**

E. H. LEE, R. D. MOORHEAD, and H. POPPA

Aug. 1979

**ARC-11214**

Vol. 4, No. 1, p. 78

Report describes results of investigation of preparation, nucleation and controlled growth of particulate deposits (palladium and iron) on electron-transparent alumina substrates. Results indicate that characteristic properties of metal deposits are strongly dependent on cleanliness, phase, and crystallographic orientation of substrate.

**B79-10208****THERMOLUMINESCENCE ANALYSIS OF AEROSOLS**

E. R. LONG, JR. and R. S. ROGOWSKI

Dec. 1979. See also NASA-TM-X-72795 (N76-21743)

**LANGLEY-12046**

Vol. 4, No. 2, p. 219

Method is presented for identifying air pollutants in field or laboratory by technique based on thermoluminescence. Approach is useful in tracing dispersion of pollutants over geographical regions and in determining cancer causing agents in the upper atmosphere.



## 04 MATERIALS

**B79-10209**

### **INSTRUMENT FOR AEROSOL CHARACTERIZATION**

G. VARSI (Caltech)

Dec. 1979

**NPO-14320**

**Vol. 4, No. 2, p. 220**

Differential pumping system that directs particles into beam moving at high speed measures size distribution and chemical composition of aerosols and is useful in study of atmospheric contamination, smog, stack gases, and chemical aerosols.

**B79-10210**

### **REMOTE MEASUREMENT OF ATMOSPHERIC POLLUTANTS**

F. ALLARIO, J. HOELL, and R. K. SEALS

Dec. 1979

**LANGLEY-12277**

**Vol. 4, No. 2, p. 221**

The concentration and vertical distribution of atmospheric ammonia and ozone are remotely sensed, using dual-CO<sub>2</sub>-laser multichannel infrared Heterodyne Spectrometer (1HS). Innovation makes atmospheric pollution measurements possible with nearly-quantum-noise-limited sensitivity and ultrafine spectral resolution.

**B79-10211**

### **MONITORING HARMFUL GASES**

W. R. HELMS and J. R. STETTER (Energetics Science, Inc.)

Dec. 1979 See also NASA-CR-153048 (N77-23439); NASA-CR-155770 (N78-18224)

**KSC-11086**

**Vol. 4, No. 2, p. 222**

Instruments are developed for monitoring presence of hydrazine and nitrogen dioxide in air. Nitrogen dioxide and hydrazine are highly toxic and explosive substances used in propellants for rocket engines. Instruments discussed are inexpensive and most useful for detecting above substances in concentrations as low as few parts per million.

**B79-10212**

### **WATER-SOLUBLE FLUOROCARBON COATING**

P. NANELLI (Pennwalt Corp.)

Dec. 1979 See also B79-10213

**MSC-16562**

**Vol. 4, No. 2, p. 223**

Water-soluble fluorocarbon proves durable nonpolluting coating for variety of substrates. Coatings can be used on metals, masonry, textiles, paper, and glass, and have superior hardness and flexibility, strong resistance to chemicals fire, and weather.

**B79-10213**

### **WATER-BASED INTUMESCENT PAINT**

D. G. SAUERS and P. NANELLI (Pennwalt Corp.)

Dec. 1979 See also B79-10212

**MSC-16609**

**Vol. 4, No. 2, p. 224**

Article discusses fire-resistant water-based paints made by adding intumescent agents to fluorocarbon coatings. Since these paints are water-based, they do not pollute atmosphere as they dry and can be used in a closed-loop air-recirculation system in spacecraft and submarines.

**B79-10214**

### **HIGH-TEMPERATURE ADHESIVES FOR POLYIMIDE FILMS**

A. K. ST. CLAIR, T. L. ST. CLAIR, and W. S. SLEMP

Dec. 1979

**LANGLEY-12348**

**Vol. 14, No. 2, p. 224**

Linear condensation polyimides which are high-temperature polymers show promise as adhesives which form flexible film coatings compatible with polyimide films. Materials are advantageous since they can be supplied as flexible tape, already B-staged and ready for bonding.

**B79-10215**

### **MODIFIED POLYMERS FOR GAS CHROMATOGRAPHY**

F. H. WOELLER (San Jose State Univ), W. CHRISTENSEN, and L. MAYER (San Jose State Univ.)

Dec. 1979

**ARC-11154**

**Vol. 4, No. 2, p. 226**

Polymeric materials are modified to serve as stationary phase in chromatographic columns used for separation of atmospheric

gases. Materials simplify and improve separation of atmospheric gases in terms of time, quantity of material needed, and sharpness of separation.

**B79-10216**

### **DETERMINING RESIN/FIBER CONTENT OF LAMINATES**

G. G. GARRARD (Rockwell International Corp.) and D. W. HOUSTON (Rockwell International Corp.)

Dec. 1979

**LANGLEY-12442**

**Vol. 4, No. 2, p. 227**

Article discusses procedure where hydrazine is used to extract graphite fibers from cured polyimide resin. Method does not attack graphite fibers and is faster than hot-concentrated-acid digestion process.

**B79-10217**

### **SYNTHESIS OF TRIARYLTRIFLUOROETHANES**

R. W. ROSSER and W. D. KRAY (Talladega College)

Dec. 1979

**ARC-11097**

**Vol. 4, No. 2, p. 228**

Article discusses preparation of triary1-2,2,2-trifluoroethanes prepared from a,a,a-trifluoroacetone by condensation with various substituted aromatic compounds. Compounds are useful as they have high thermal stability.

**B79-10218**

### **FLAT-FLAME BURNER**

G. C. FRYBURG, F. J. KOHL, R. A. MILLER, and C. A. STERNS

Dec. 1979 See also NASA-TM-X-73600 (N77-19209); NASA-TM-73794 (N78-13157); B79-10219

**LEWIS-13161**

**Vol. 4, No. 2, p. 229**

Aqueous solutions of inorganic salts are aspirated and then nebulized into mixing chamber of flat-flame burner to study behavior of inorganic salts in flames.

**B79-10219**

### **HIGH-PRESSURE MASS-SPECTROMETRIC SAMPLING SYSTEM**

G. C. FRYBURG, F. J. KOHL, R. A. MILLER, and C. A. STERNS

Dec. 1979 See also NASA-TM-73720 (N77-32242); B79-10218

**LEWIS-12913**

**Vol. 4, No. 2, p. 230**

Mass spectrometric sampler directs sampling of gaseous species from systems at atmospheric pressure. Method is accomplished through orifice machined in platinum cone.

**B79-10220**

### **ANALYSIS OF FATIGUE DAMAGE IN COMPOSITES**

J. D. WHITCOMB

Dec. 1979 See also NASA-TM-78693 (N78-23457)

**LANGLEY-12431**

**Vol. 4, No. 2, p. 231**

Finite-element heat-transfer analysis determines sites of potential failure in composite materials. Method is sensitive to matrix damage and fiber disbonding that occurs long before actual fiber breakage.

**B79-10221**

### **STRENGTH ENHANCEMENT OF PREALLOYED POWDER SUPERALLOYS**

J. C. FRECHE and W. J. WATERS

Dec. 1979 See also NASA-TM-78834 (N78-21266)

**LEWIS-13173**

**Vol. 4, No. 2, p. 232**

Strengthening and forming process for prealloyed powder superalloys greatly increases material strength in the 900-1,200 F temperature range. Process which involves superplastically-deforming compacted powders at controlled rates and temperature is most effective on nickel-base alloys.

**B79-10222**

### **IMPROVED ION-SELECTIVE MEMBRANES**

S. S. ALEXANDER (Ionics, Inc.)

Dec. 1979 See also NASA-CR-134931 (N76-18670); NASA-CR-135316 (N78-18515); NASA-TM-73751 (N78-14631); NASA-TM-73873 (N78-19656); B76-10070

**LEWIS-12678**

**Vol. 4, No. 2, p. 233**

Ion-selective membranes are developed in evolution of

REDOX (reduction-oxidation) electrochemical bulk energy storage concept which have exceptional selectivity giving three orders of magnitude improvement over commercially available membranes.

**B79-10223****IMPROVED INVERTED STEPANOV APPARATUS**

S. BERKMAN (RCA Corp.) and H. E. TEMPLE (RCA Corp.)

Dec. 1979

**NPO-14297**

Vol. 4, No. 2, p. 234

Modifications in inverted Stepanov process improve heat transfer and energy efficiency in growing silicon ribbon crystals. Using system, silicon is directly heated by induction, minimizing heat transfer and contamination problems.

**B79-10224****FIBROUS REFRACTORY COMPOSITE INSULATION**

H. E. GOLDSTEIN, M. SMITH, and D. B. LEISER (Stanford Univ.)

Dec. 1974

**ARC-11169**

Vol. 4, No. 2, p. 235

Family of high-temperature, low-density refractory composite insulations made from aluminoborosilicate and silica fibers has insulating material with improved mechanical and thermal properties. Composition is useful for reusable heat-shield materials.

**B79-10225****FATIGUE PROPERTIES OF COLUMBIUM ALLOY**

R. A. CROSBY (The Marquardt Co.) and F. K. LAMPSON (The Marquardt Co.)

Dec. 1979

**MSC-18256**

Vol. 4, No. 2, p. 235

Report presents data from series of tests undertaken to determine room-temperature fatigue properties of C-103 columbium alloy and its combination with Ti-6Al-4V weldments.

**B79-10226****USE OF COMPOSITES IN ELECTRIC VEHICLES**

R. H. DAWE (Caltech), D. B. EDWARDS (Caltech), and H. A. FRANK (Caltech)

Dec. 1979

**NPO-14615**

Vol. 4, No. 2, p. 236

Report presents study of weight savings in electric vehicles by using alternative structural materials, particularly composites. Topics discussed include safety, aerodynamics, esthetics, and cost.

**B79-10353****FLAME-RESISTANT TEXTILES**

L. C. FOGG (Sci. Appl., Inc.), R. S. STRINGHAM (Sci. Appl., Inc.), and M. S. TOY (Sci. Appl., Inc.)

Apr. 1980 See also NASA-CR-151834 (N79-10149)

**MSC-18359**

Vol. 4, No. 3, p. 369

Flame resistance treatment for acid resistant polyamide fibers involving photoaddition of fluorocarbons to surface has been scaled up to treat 10 yards of commercial width (41 in.) fabric. Process may be applicable to other low cost polyamides, polyesters, and textiles.

**B79-10354****FOUR-STEP REACTION FOR POLYTRIAZINE ELASTOMERS**

R. W. ROSSER and R. A. KORUS (San Jose State University)

Apr. 1980

**ARC-11248**

Vol. 4, No. 3, p. 370

Four step imidoylamidine reaction sequence is used to make crosslinked polyperfluoralkyltriazines with superior elastomeric properties, greater molecular weight, and crosslinking control. Polymers can find useful application in fuel tank sealants, o-ring, wire enamels, pneumatic ducts, and many other applications.

**B79-10355****HEAT- AND CHEMICAL-RESISTANT OXDIAZOLE ELASTOMERS**

R. W. ROSSER, H. KWONG (San Jose State Foundation), and I. M. SHALHOUB (San Jose State Foundation)

Apr. 1980

**ARC-11253**

Vol. 4, No. 3, p. 371

Heat and chemical resistant polymers with triazine crosslinks are prepared by thermal condensation reactions to form 1,2,4-oxdiazole linkages. They are compounded with variety of fillers, extenders, and modifiers for numerous applications in which stability, impermeability to liquids and gases, good plasticity, and elasticity or rigidity are important.

**B79-10356****SYNTHESIS OF 2, 4, 8, 10-TETROXASPIRO (5.5) UNDECANE**

A. C. POSHKUS (National Res. Council)

Apr. 1980

**ARC-11243**

Vol. 4, No. 3, p. 371

Method drastically reduces preparation time pentaerythritol diformal from several hours to time span of 3 to 20 minutes with yields greater than 90 percent. Other advantages include elimination of solvents, decrease in labor and energy needs, adaptability to continuous operations, and overall simplicity and convenience.

**B79-10357****RELATING VISCOSITY TO POLYMER CONCENTRATION**

R. F. FEDORS (Caltech)

Apr. 1980

**NPO-14609**

Vol. 4, No. 3, p. 372

Equation developed by VanDijk and first applied to viscosity of Newtonian suspension of rigid particles by Eilers is rearranged to yield intrinsic viscosity as explicit function of polymer concentration in polymer solvent system. Experiments have shown relationship valid for polymer solutions having relative viscosities ranging from 1 to 100.

**B79-10358****SIMPLE ESTIMATE OF CRITICAL VOLUME**

R. F. FEDORS (Caltech)

Apr. 1980

**NPO-14464**

Vol. 4, No. 3, p. 373

Method for estimating critical molar volume of materials is faster and simpler than previous procedures. Formula sums no more than 18 different contributions from components of chemical structure of material, and is as accurate (within 3 percent) as older more complicated models. Method should expedite many thermodynamic design calculations.

**B79-10359****EQUILIBRIUM SWELLING OF ELASTOMERS IN SOLVENTS**

R. F. FEDORS (Caltech)

Apr. 1980

**NPO-14637**

Vol. 4, No. 3, p. 374

Two proposed empirical equations, developed from Eilers-VanDijk equation to characterize relative modulus of filled elastomers as function of filler content, describe: (1) equilibrium swelling for cases where fillers are composed of permanent aggregates of primary particles; and (2) equilibrium swelling when filler material is composed of non-aggregated particles.

**B79-10360****DOUBLE-WALL TUBING FOR OIL RECOVERY**

L. H. BACK (Caltech), W. F. CARROLL (Caltech), L. D. JAFFEE (Caltech), and L. D. STIMPSON (Caltech)

Apr. 1980 See also B79-10369

**NPO-14606**

Vol. 4, No. 3, p. 375

Insulated double-wall tubing designed for steam injection oil recovery makes process more economical and allows deeper extension of wells. Higher quality wet steam is delivered through tubing to oil deposits with significant reductions in heat loss to surrounding rock allowing greater exploitation of previously unworkable reservoirs.

**B79-10361****POST-PROCESSING FLAME-RETARDANT FOR POLYURETHANE**

P. MONAGHAN (Arthur D. Little, Inc.) and K. R. SIDMAN (Arthur D. Little, Inc.)

Apr. 1980 See also NASA-CR-144362 (N75-29264)

## 04 MATERIALS

### MSC-16307

Vol. 4, No. 3, p. 376

Treatment of polyurethane form with elastomer formulation after processing makes foam fire resistant without compromising physical properties. In testing, once ignition source is removed, combustion stops. Treatment also prevents molten particle formation, generates no smoke or toxic gases in fire, and does not deteriorate under prolonged exposure to Sun.

### B79-10362

#### OZONE INHIBITS CORROSION IN COOLING TOWERS

K. R. FRENCH (Caltech), R. D. HOWE (Caltech), and M. F. HUMPHREY (Caltech)

Apr. 1980

### NPO-14340

Vol. 4, No. 3, p. 377

Commercially available corona discharge ozone generator, fitted onto industrial cooling tower, significantly reduces formation of scales (calcium carbonate) and corrosion. System also controls growth of algae and other microorganisms. Modification lowers cost and improves life of cooling system.

### B79-10363

#### MEASURING COAL THICKNESS

C. BARKER (Univ. of Missouri at Rolla), J. BLAINE (Univ. of Missouri at Rolla), G. GELLER (Univ. of Missouri at Rolla), R. ROBINSON (Univ. of Missouri at Rolla), D. SUMMERS (Univ. of Missouri at Rolla), and J. TYLER

Apr. 1980

### M-FS-23979

Vol. 4, No. 3, p. 378

Laboratory tested concept, for measuring thickness of overhead coal using noncontacting sensor system coupled to controller and high pressure water jet, allows mining machines to remove virtually all coal from mine roofs without danger of cutting into overlying rock.

### B79-10364

#### PRECISE WET-CHEMICAL ETCHING

F. J. GRUNTHANER (Caltech)

Apr. 1980

### NPO-14339

Vol. 4, No. 3, p. 379

Controlled amount of etchant applied to surface of rotating sample removes only few angstroms of material. Technique is suited to study of chemical and crystal structures. Rate can be varied through control of spin frequency, liquid viscosity, droplet size, total etchant volume, etchant concentration.

### B79-10365

#### DETECTING OXYGEN IN HYDROGEN OR HYDROGEN IN OXYGEN

A. C. ERICKSON (General Electric Co.)

Apr. 1980

### MSC-18380

Vol. 4, No. 3, p. 380

Catalytic sensor operates in high-pressure, moisture-laden gases. It was developed for life support system in which water is decomposed by electrolysis to produce oxygen and hydrogen. Sensor has potential applications in gas-detection and measurement instruments, particularly for gases generated by electrolysis, because such gases may contain large amounts of moisture.

### B79-10366

#### AN IMPROVED CAPILLARY RHEOMETER

S. P. FEINSTEIN (Caltech)

Apr. 1980

### NPO-14501

Vol. 4, No. 3, p. 380

Capillary rheometer incorporates cone-tipped preheated piston to compress plastized coal sample through narrow tube. Applied force is proportional to viscosity and is recorded on separate instrument. Samples are heated rapidly due to large area of cone surface. Device, primarily applied in designing efficient equipment for feeding coal into combustion chamber, may be readily used in other viscosity studies.

### B79-10367

#### NEW APPROACH TO PURIFYING SILICON

R. E. CHANEY (Motorola, Inc.), W. M. INGLE (Motorola, Inc.), and S. W. THOMPSON (Motorola, Inc.)

Apr. 1980

### NPO-14474

Vol. 4, No. 3, p. 381

Silicon tetrafluoride gas removes metallurgical-grade impurities when passed over silicon in quartz tube. Technique allows inexpensive increase in throughput rate. Approach could improve silicon production for silicon solar cells.

### B79-10368

#### COMPACT REACTOR FOR ONBOARD HYDROGEN GENERATION

T. A. BRABBS

Apr. 1980 See also NASA-TP-1247 (N78-23256)

### LEWIS-13033

Vol. 4, No. 3, p. 382

Hydrogen, chemically stored as methanol, is promising internal-combustion fuel. Methanol is readily obtainable from natural products such as wood, compost, or various organic wastes. Steam reformation of methanol as source for hydrogen is relatively simple operation.

### B79-10369

#### WATER-COOLED INSULATED STEAM-INJECTION WELLS

L. H. BACK (Caltech) and L. D. JAFFE (Caltech)

Apr. 1980

### NPO-14605

Vol. 4, No. 3, p. 383

Water is used as insulated coolant and heat-transfer medium for steam-injection oil wells. Approach is somewhat analogous to cooling system in liquid-propellant rocket. In addition to trapping and delivering heat to steam-injection point, water will also keep casing cooler, preventing or reducing casing failures caused by thermal stresses.

### B79-10370

#### HIGH-TEMPERATURE INSULATION

R. E. MOWERS (Rockwell Intern. Corp.) and A. C. PETERSON (Rockwell Intern. Corp.)

Apr. 1980

### M-FS-19498

Vol. 4, No. 3, p. 384

Lightweight insulating material works over very broad temperature range. Material is unaffected by moisture or hydraulic oil and is usable at temperatures ranging from 2,200 F (1,200 C) to cryogenic levels. It is readily applied to number of high-temperature and cryogenic processes.

### B79-10371

#### MOSSBAUER STUDY OF $\text{FeSi}_2$ AND $\text{FeSe}$ THIN FILMS

K. AGGARWAL, W. T. ESCUE, and R. G. MENDIRATTA

Apr. 1980

### M-FS-25088

Vol. 4, No. 3, p. 384

Structural studies of  $\text{FeSi}_2$  and  $\text{FeSe}$  thin films have been conducted via Mossbauer spectroscopy as continuation of earlier investigation of  $\text{FeTe}$  films. Results discuss structures of bulk and thin-film  $\text{FeSi}_2$  and bulk and thin-film  $\text{FeSe}$ .

### B79-10372

#### STRESS CORROSION IN HIGH-STRENGTH ALUMINUM ALLOYS

R. C. DORWARD (Kaiser Aluminum and Chemical Corp.) and K. R. HASSE (Kaiser Aluminum and Chemical Corp.)

Apr. 1980

### M-FS-23986

Vol. 4, No. 3, p. 385

Report describes results of stress-corrosion tests on aluminum alloys 7075, 7475, 7050, and 7049. Tests compare performance of original stress-corrosion-resistant (SCR) aluminum, 7075, with newer, higher-strength SCR alloys. Alloys 7050 and 7049 are found superior in short-transverse cross-corrosion resistance to older 7075 alloy; all alloys are subject to self-loading effect caused by wedging of corrosion products in cracks. Effect causes cracks to continue to grow, even at very-low externally applied loads.

### B79-10373

#### TEMPERATURE AND MOISTURE ANALYSIS IN COMPOSITES

D. R. TENNEY, S. S. TOMPKINS, and J. UNNAM (Geo. Washington Univ.)

Apr. 1980

### LANGLEY-12452

Vol. 4, No. 3, p. 385

Advanced fiber-reinforced polymeric matrix composites have emerged as strong candidate materials for airframe applications. Favorable aspects include high strength, stiffness, and low density. Temperature and Moisture Analysis in Composites (TMAC) program was developed to study effect of variations in diffusion coefficients, surface properties, panel tilt, ground reflection, and geographical location on moisture-concentration profiles and average moisture contents of composite laminates.

**B79-10502**  
**SIMULTANEOUS STACK-GAS SCRUBBING AND WASTE WATER TREATMENT**

J. C. PORADEK and D. D. COLLINS (Chemsoil Corp.)  
Jun. 1980 See Also NASA-CR-160280 (N80-12620)

**MSC-16258** Vol. 4, No. 4, p. 503

Simultaneous treatment of wastewater and SO<sub>2</sub>-laden stack gas make both treatments more efficient and economical. According to results of preliminary tests, solution generated by stack gas scrubbing cycle reduces bacterial content of wastewater. Both processes benefit by sharing concentrations of iron.

**B79-10503**  
**LOW COST DISPOSAL OF MMH**

J. J. THOMAS (Florida Institute of Technology) and T. FRENCH (Florida Institute of Technology)  
Jun. 1980

**KSC-11135** Vol. 4, No. 4, p. 504

Concentration of gaseous toxic monomethylhydrazine (MMH) can be removed at 99.9% efficiency using scrubbers containing acetylacetone solutions as scrubbing liquors. Resulting product is easily disposable and expensive liners for protecting scrubber from strong oxidizing agents are not needed.

**B79-10504**  
**A LOW-COST MOLECULAR-LEAK VALUE**

C. M. JUDSON (Analog Technology Corp.), J. L. LAWRENCE, JR. (Analog Technology Corp.), and F. P. PICKETT (Analog Technology Corp.)  
Jun. 1980

**LANGLEY-12249** Vol. 4, No. 4, p. 505

Solenoid operated modular-leak and shutoff valve has been developed for small portable, automated, mass spectrometer used to measure trace constituents of air or other gases. Valve costs much less to produce than precision needle-in-foil type. Yet its performance closely matches that version.

**B79-10505**  
**IMPROVED SYNTHESIS OF POLYFORMALS**

A. C. POSHKUS  
Jun. 1980

**ARC-11244** Vol. 4, No. 4, p. 506

Polyformals are prepared in less than 15 min. as opposed to hours or days by conventional processes. Product can be converted into ethylenically unsaturated monomers and into aphyrogenic and pyrostatic phosphorylated derivatives and the like.

**B79-10506**  
**SEPARATING LIQUID AND GASEOUS SOLUTIONS**

J. W. BENEFIELD (Lockheed Aircraft Corp.) and P. GRODZKA (Lockheed Aircraft Corp.)  
Jun. 1980

**M-FS-23368** Vol. 4, No. 4, p. 506

Clusius-Dickel separation (CDS) technique, currently used in laboratory scale separation of certain isotopes, may find more effective applications in low-gravity, space environments. Many advantages in power supply, mechanical stresses, and spatial arrangement can be realized in space, making technique suitable for biological and polymer separations.

**B79-10507**  
**SELF-CURING POLYIMIDE FOAM**

S. R. RICCITIELLO and P. M. SAWKO  
Jun. 1980

**ARC-11170** Vol. 4, No. 4, p. 507

Chemical formulation produces foamed polyimide plastic without external heat. Foam is less dense and more flame and

acid resistant than conventional polyimide foams. Self curing foam can be formed 'onsite' in limited access locations where application of heat is difficult or impossible.

**B79-10508**  
**COMPOSITES OF IMMISCIBLE METALS**

M. H. JOHNSTON, J. C. MCCLURE, and R. A. PARR  
Jun. 1980

**M-FS-23816** Vol. 4, No. 4, p. 508

Process aids development of composites of metals that are immiscible in liquid phase. Aligned uniformly dispersed spheres or rods of bismuth in aluminum, lead in aluminum, bismuth in zinc, and other systems have been prepared. Dispersed and matrix metal are selected according to desired electrical or mechanical properties.

**B79-10509**  
**VACUUM-BONDED COVERING WITHSTANDS LOW TEMPERATURES**

G. LERMA (Rockwell International Corp.) and Z. SIMINSKI (Rockwell International Corp.)  
Jun. 1980

**MSC-16235** Vol. 4, No. 4, p. 509

Aluminum foil, tetrafluoroethylene (TEF), and glass fabric are vacuum bonded together to make composite covering material that is flexible, easy to handle, and unaffected by cryogenic temperatures.

**B79-10510**  
**LONGER SHELF LIFE FOR CERAMIC SLURRIES**

Y. D. IZU (Lockheed Missiles and Space Co.) and T. M. TANABE (Lockheed Missiles and Space Co.)  
Jun. 1980

**MSC-18543** Vol. 4, No. 4, p. 509

Viscosity of ceramic-coating slurries containing organic acrylate viscosity-control agent is stabilized for over 2 months by addition of ammonium hydroxide without significant changes.

**B79-10511**  
**SHEAR STRENGTH OF ALUMINUM FILLET WELDS**

C. V. LOVOY

Jun. 1980 See also NASA-TM-78168 (N78-21495)

**M-FS-23946** Vol. 4, No. 4, p. 510

Shear-strength tests on aluminum fillet welds are documented in report. Tests were made on aluminum alloy 2219 to aid designers in specifying sizes and lengths of fillet welds necessary to sustain expected loads in this material. Report discusses fillet-weld size and geometry, including root penetration and surface contour.

**B79-10512**  
**ENGINEERING PROPERTIES OF INCOLOY-903 AND CTX-1**

P. E. RUFF (Battelle Memorial Inst.)

Jun. 1980

**M-FS-23359** Vol. 4, No. 4, p. 510

Engineering properties of Incoloy-903 sheet and CTX-1 (high strength austenitic Fe-Ni-Co alloy) bar are characterized in report. Report includes tables and plots of test data and photographs of microstructure of samples used. Two appendixes include specimen configuration and data collected from industrial survey.

**B79-10513**  
**UNRESOLVED MOSSBAUER HYPERFINE SPECTRA**

J. R. SCHIESS and J. J. SINGH  
Jun. 1980

**LANGLEY-12439** Vol. 4, No. 4, p. 511

Program analyzes unresolved Mossbauer hyperfine spectra resulting from existence of several local environments in dilute binary iron alloys. It has proven useful in studying effects of impurity atoms on iron Mossbauer spectra.

**B79-10514**  
**SINGLE-, TWO-, AND THREE-PHASE BINARY-ALLOY SYSTEMS**

D. R. TENNEY  
Jun. 1980

## 05 LIFE SCIENCES

### LANGLEY-12381 Vol. 4, No. 4, p. 511

Series of three computer programs solve one dimensional transient diffusion problems in single and multiphase binary-alloy systems. Accurate understanding of diffusion process in binary-alloy system is important for development of metal matrix composites, some protective coatings, and thin-film technology.

## 05 LIFE SCIENCES

### B79-10081 HIGH-RESOLUTION ECHOCARDIOGRAPHY R. NATHAN Aug. 1979

**NPO-14349 Vol. 4, No. 1, p. 81**

High resolution computer aided ultrasound system provides two and three dimensional images of beating heart from many angles. System provides means for determining whether small blood vessels around the heart are blocked or if heart wall is moving normally without interference of dead and noncontracting muscle tissue.

### B79-10082 MICROCOMPUTER HELPS EVALUATE SKIN BURNS V. J. ANSELMO and T. H. REILLY Aug. 1979

**NPO-14402 Vol. 4, No. 1, p. 82**

Microcomputer analysis of multispectral imaging of burn area aids production of display map of field and partial thickness burns making more effective clinical treatment possible.

### B79-10083 ARTIFICIAL LIMB CONNECTOR C. W. BRIGHT, L. J. OWENS, V. MOONEY (Rancho Los Amigos Hospital), and J. B. RESWICK (Rancho Los Amigos Hospital) Aug. 1979

**KSC-11069 Vol. 4, No. 1, p. 83**

Flexible connector gives skin freedom needed to self-adjust to promote healing of flesh and to relieve skin stresses while maintaining skin seal surrounding implanted percutaneous sleeve used with bone fixation prosthetic connector.

### B79-10084 EYE-CONTROLLED SWITCH G. L. WALKER (Hayes International Corp.) and B. G. WEAVER (Hayes International Corp.) Aug. 1979

**M-FS-25091 Vol. 4, No. 1, p. 84**

Eye motion sensor clipped to standard eyeglass frame and circuit allows electric wheel chair to be controlled by eye movements alone.

### B79-10085 IDENTIFICATION OF MICRO-ORGANISMS G. R. TAYLOR and S. N. ZALOGUEV (U.S.S.R. Ministry of Health) Aug. 1979 See also NASA-TM-58185 (N78-29725)

**MSC-18358 Vol. 4, No. 1, p. 85**

Manual presents detailed laboratory procedures for identifying aerobic or microaerobic bacteria, yeast or yeastlike organisms, and filamentous fungi and conducting other microbiological or immunological evaluations of samples taken from human subjects. Standardized procedures should be useful to researchers and clinicians in laboratories, hospitals and other biological test facilities.

### B79-10227 IMPROVED TEMPERATURE-CONTROL GARMENT R. L. COX (Vought Corp.) and C. W. HIXON (Vought Corp.) Dec. 1979

**ARC-11239 Vol. 4, No. 2, p. 239**

Multilayer fabric containing polyurethane tubing is used in

fabrication of liquid cooled garments. Cooling helmets may be assembled from material and various garments used for heating can be developed.

### B79-10228 PLATINUM ELECTRODES FOR ELECTROCHEMICAL DETECTION OF BACTERIA

J. R. WILKINS  
Dec. 1979 See also B78-10236

**LANGLEY-12462 Vol. 4, No. 2, p. 240**

Bacteria is detected electro-chemically by measuring evolution of hydrogen in test system with platinum and reference electrode. Using system, electrodes of platinum are used to detect and enumerate varieties of gram-positive and gram-negative organisms compared in different media.

### B79-10229 WIDEBAND ELECTRONICS FOR ULTRASONIC TISSUE CHARACTERIZATION

P. GAMMELL (Caltech)  
Dec. 1979  
**NPO-14461 Vol. 4, No. 2, p. 241**

System utilizing natural ringing frequency of electronic circuit coupled to wideband transducer is used to determine frequency dependence of ultrasonic properties of tissue. With procedure frequency data can be obtained rapidly and inexpensively.

### B79-10230 COUPLER FOR SURGERY ON SMALL ANIMALS J. E. JOHNSON, JR. and P. F. SWARTZ Dec. 1979

**ARC-11114 Vol. 4, No. 2, p. 242**

Minicoupler simplifies exchange of fluids with organs of laboratory animals enabling one person to perform surgery on experimental animals such as rats and mice. Innovation eliminates obstructing hands and instruments from areas of surgery.

### B79-10231 CINEMICROGRAPHIC SPECIMEN HOUSING J. R. WILKINS Dec. 1979

**LANGLEY-12047 Vol. 4, No. 2, p. 243**

Housing used to observe gravitation effects on specimens embedded in support media, such as agar, supports microbial specimens vertically for time-lapsed cinemicrographic studies. Procedure cannot be performed with conventional microscopes which see specimens in horizontal plane only.

### B79-10232 IMPROVED CAPACITIVE EKG ELECTRODE J. L. DAY, M. E. GRIFFITH (Texas Tech Univ.), W. M. PORTNOX (Texas Tech Univ.), and L. J. STOTTS (Texas Tech Univ.) Dec. 1979

**MSC-18321 Vol. 4, No. 2, p. 244**

Light, compact electrode monitors heart signals through burn ointment and requires no electrolyte paste for coupling to skin. Innovation is useful because of its ability to monitor heart condition of burn victims.

### B79-10233 LOW-DOSE TOTAL-BODY-CALCIUM ANALYSIS T. K. LEWELLEN (Washington Univ.) and W. B. NELP (Washington Univ.) Dec. 1979 See also NASA-CR-151675 (N78-22696)

**MSC-18282 Vol. 4, No. 2, p. 245**

Report details technique for measuring total body calcium by collecting exhaled  $^{37}\text{Ar}$  gas after exposure of patients to 14-MeV neutrons. Summary for theoretical basis of technique is presented.

### B79-10234 ANTHROPOMETRIC SOURCEBOOK R. L. BOND, J. T. JACKSON, A. J. LOUVIERE, and W. E. THORNTON Dec. 1979 See also NASA-RP-1024 (N79-11734); NASA-RP-1024 (N79-13711); NASA-RP-1024 (N79-13712)

**MSC-18500****Vol. 4, No. 2, p. 245**

Three volume 'Anthropometric Source Book' contains large body of anthropometric data, design information, and references. Subjects covered include variability in body size, mass distribution properties of human body, arm and leg reach, joint motion and numerous other materials.

**B79-10235****ANALYZING WATER RESOURCES**

Innovator not given (Ecosystems International, Inc.) Dec. 1979 See also NASA-CR-150467 (N78-13509)

**M-FS-25104****Vol. 4, No. 2, p. 245**

Report on water resources discusses problems in water measurement demand, use, and availability. Also discussed are sensing accuracies, parameter monitoring, and status of forecasting, modeling, and future measurement techniques.

**B79-10374****IMPROVEMENT OF CAT SCANNED IMAGES**

E. ROBERTS, JR.

Apr. 1980 See also NASA-TM-78974 (N78-31690); NASA-TN-D-8529 (N77-29539)

**LEWIS-13276****Vol. 4, No. 3, p. 389**

Digital enhancement procedure improves definition of images. Tomogram is generated from large number of X-ray beams. Beams are collimated and small in diameter. Scanning device passes beams sequentially through human subject at many different angles. Battery of transducers opposite subject senses attenuated signals. Signals are transmitted to computer where they are used in construction of image on transverse plane through body.

**B79-10375****IMPROVED OPTICS FOR AN ULTRACENTRIFUGE**

C. G. MILLER (Caltech) and J. B. STEPHENS (Caltech)  
Apr. 1980

**NPO-13657****Vol. 4, No. 3, p. 390**

Ultracentrifuge is important tool in study of polymers, biomolecules, and cell structures. In typical ultracentrifuge rotor supports pair of optically matched vials; one contains sample mixed in solvent, and other is reference that contains only solvent. Doubleslit optical system, transverse to rotor, creates interference pattern on photographic plate each time vials pass through optics. Medium in sample vial displaces interference maximums such that shift gives measurement of density distribution along length of sample.

**B79-10376****IMPROVED MICROBIAL-CHECK-VALVE RESINS**

G. V. COLOMBO (Umpqua Research Co.) and D. F. PUTNAM (Umpqua Research Co.)

Apr. 1980 See also NASA-CR-151678 (N78-22719); (NASA-CR-151843 (N79-11733)

**MSC-18377****Vol. 4, No. 3, p. 392**

Improved microbial-check-valve resins have been tested for their microbicidal effectiveness and long-term stability. Resins give more stable iodine concentrations than previous preparations and do not impart objectionable odor or taste to treated water. Microbial check valve is small cylindrical device, packed with iodide-saturated resin, that is installed in water line where contamination by micro-organisms is to be prevented. Prototype microbial check valve was tested for stability and performance under harsh environmental conditions. Effectiveness was 100 percent at 35 deg, 70 deg, and 160 deg F (2 deg, 21 deg, and 71 deg C).

**B79-10377****COMPUTER MEASUREMENT OF ARTERIAL DISEASE**

J. ARMSTRONG (Caltech), R. H. SELZER (Caltech), R. BARNDT (Univ of Southern Calif.), D. H. BLANKENHORN (Univ. of Southern Calif.), and S. BROOKS (Univ. of Southern Calif.)

Apr. 1980

**NPO-14266****Vol. 4, No. 3, p. 393**

Image processing technique quantifies human atherosclerosis by computer analysis of arterial angiograms. X-ray film images are scanned and digitized, arterial shadow is tracked, and several quantitative measures of lumen irregularity are computed. In other

tests, excellent agreement was found between computer evaluation of femoral angiograms on living subjects and evaluation by teams of trained angiographers.

**B79-10515****INDIRECT MICROBIAL DETECTION**

J. R. WILKINS

Jun. 1980

**LANGLEY-12520****Vol. 4, No. 4, p. 515**

Indirect method for detection of microbial growth utilizes flow of charged particles across barrier that physically separated growing cells from electrodes and measures resulting difference in potential between two platinum electrodes. Technique allows simplified noncontact monitoring of all growth in highly infectious cultures or in critical biochemical studies.

**B79-10516****EXTRACTING TRACE SUBSTANCES FROM BIOLOGICAL FLUIDS**

A. ZLATKIS (Univ. of Houston)

Jun. 1980

**MSC-18522****Vol. 4, No. 4, p. 516**

Apparatus is used as aid in extraction of trace amounts of volatile organics from biological fluids. 'Transervaporator' makes it possible to prepare volatile fraction for analysis by high-resolution gas chromatography.

**B79-10517****MONITORING FETAL PH BY TELEMETRY**

A. BLUM, T. DONAHOE, M. D. JHABVALA, and W. RYAN

Jun. 1980

**GSFC-12507****Vol. 4, No. 4, p. 517**

Telemetry unit has been developed for possible use in measuring scalp-tissue pH and heart rate of unborn infant. Unit radius data to receiver as much as 50 ft. away. Application exists during hours just prior to childbirth to give warning of problems that might require cesarean delivery.

**B79-10518****TRIFUNCTIONAL TRANSDUCER FOR MYOCARDIAL MONITORING**

V. H. CULLER (Caltech), C. FELDSTEIN (Caltech), G. W. LEWIS (Caltech), and S. MEERBAUM (Sinai Medical Center)

Jun. 1980

**NPO-14329****Vol. 4, No. 4, p. 517**

Prototype myocardial transducer simultaneously monitors internal force, displacement, and thickness of heart muscle fiber within localized area of heart muscle. Transducer can be placed in area less than 1.5 by 4 mm.

## 06 MECHANICS

**B79-10086****CONTAINERLESS HIGH-TEMPERATURE CALORIMETER**

L. L. LACY, D. B. NISEN, and M. B. ROBINSON

Aug. 1979

**M-FS-23923****Vol. 4, No. 1, p. 89**

Samples are heated by electron bombardment in high-temperature calorimeter that operates from 1,000 to 3,600 C yet consumes less than 100 watts at temperatures less than 2,500 C. Contamination of samples is kept to minimum by suspending them from wire in vacuum chamber. Various sample slopes such as wires, disks, spheres, rods, or irregular bodies can be accommodated and only about 100 mg of samples are needed for accurate measurements.

**B79-10087****OBTAINING AN ELECTRICAL OUTPUT FROM A MECHANICAL FLOWMETER**

W. T. POWERS

## 06 MECHANICS

Aug. 1979

**M-FS-23958**

**Vol. 4, No. 1, p. 90**

Circuit using optical sensor, low power counting electronics, one clip digital-to-analog converter and operational amplifier converts mechanical readout of water, gas, fuel oil or power meter to analog signal suitable for online processing.

**B79-10088**

**DIFFERENTIAL OIL FLOWMETER**

W. T. POWERS

Aug. 1979

**M-FS-23959**

**Vol. 4, No. 1, p. 91**

Difference in oil flow volume through two mechanical flowmeters is converted to analog signal by simple inexpensive circuit. Circuit can be implemented with only minor changes to conventional oil flowmeters and used to measure fuel consumed by oil fired furnace or water heater.

**B79-10089**

**BIDIRECTIONAL FLUID-FLOW MONITOR**

S. L. BARAJAS (Rockwell International Corp.)

Aug. 1979

**MSC-16762**

**Vol. 4, No. 1, p. 92**

Bidirectional fluid-flow monitor detects flow rates as low as 0.1 gal/min (0.41/min) and operates at temperatures up to 350 F (177 C) and at pressures to 500 psig (3.6 X 10 to the sixth power N/M squared). Monitor shows 'no flow' or 'maximum flow' conditions and approximately indicates immediate flow rates.

**B79-10090**

**ELECTRICAL INDICATION OF AIRFLOW RATE**

C. MURRISH (Life Sciences Engineering)

Aug. 1979

**M-FS-23873**

**Vol. 4, No. 1, p. 92**

Adaption of gas-flow measurement technique originally developed by C. C. Thomas in 1911 is used for temperature measurements which are easily converted to electrical signals.

**B79-10091**

**NONDESTRUCTIVE PULL TESTER**

A. LEVY (Hughes Aircraft Co.)

Aug. 1979

**MSC-18329**

**Vol. 4, No. 1, p. 93**

Quality control of welded electric wires is improved with easy-to-use tool applying small constant pull force to weldment (typically less than one-twentieth force required to pull weld apart).

**B79-10092**

**PUSH TEST FOR SWITCH WELDS**

C. J. TORBORG (Honeywell, Inc.)

Aug. 1979

**M-FS-25027**

**Vol. 4, No. 1, p. 94**

Pencil-like tool that applies low predetermined force, may be used to individually test switch welds for identification of poor or marginal welds without harming good ones.

**B79-10093**

**CHECKING WELD PENETRATION**

D. I. MACFARLANE (Rockwell International Corp.)

Aug. 1979

**M-FS-19395**

**Vol. 4, No. 1, p. 95**

Fused wire in weld root area verifies weld penetration in electron-beam-welded joints. Method could be used in automotive, aircraft, and machinery manufacturing when electron-beam-welds cannot be inspected ultrasonically.

**B79-10094**

**ULTRASONIC GRATING CHECKS ELECTRON-BEAM WELDS**

H. A. MITCHELL (Rockwell International Corp.)

Aug. 1979

**M-FS-19422**

**Vol. 4, No. 1, p. 95**

Remote inspection technique uses reflectance of ultrasonic waves from machined steps in root area of electron beam welds to indicate sound or faulty welds.

**B79-10095**

**ACCURATE MEASUREMENTS OF MASS AND CENTER OF MASS**

E. Y. CHOW and M. R. TRUBERT

Aug. 1979 See also NASA-CR-156130 (N78-20177)

**NPO-14428**

**Vol. 4, No. 1, p. 96**

Object is measured for mass and center of mass with accuracies of 0.01% and 0.14% respectively, using method that eliminates errors in alignment, leveling, and calibration. Method is applied to scientific instruments, recorder turntables, flywheels, and other devices that require precise balancing.

**B79-10096**

**MEASURING RESISTANCE OR CONDUCTANCE OF INSULATORS**

H. S. MAY (Rockwell International Corp.)

Aug. 1979

**MSC-18132**

**Vol. 4, No. 1, p. 98**

Device protects stable fixture for holding electrodes against specimen conductance or resistance measurement with substantially less labor and expense than previous methods.

**B79-10097**

**LASER ALIGNMENT OF LARGE ASSEMBLIES**

W. S. CAZARES (Rockwell International Corp.) and D. D. KERN (Rockwell International Corp.)

Aug. 1979

**MSC-19346**

**Vol. 4, No. 1, p. 99**

Electronically leveled laser instrument, incorporating special tiltmeter-controlled laser alignment transit, simplifies alignment of large structure. System operated from single alignment reference tower saves time and costs in assembling of structures.

**B79-10098**

**MEASURING THE THICKNESS OF PLASTIC FILMS**

K. C. DONOHOE and T. WYDEVEN, JR.

Aug. 1979

**ARC-11219**

**Vol. 4, No. 1, p. 100**

Optical instrument measures thickness of translucent and transparent sheets in thickness range from 2 to 8 microns by monitoring attenuation of light as it passes through sheet.

**B79-10099**

**TROUBLESHOOTING PLATED-WIRE MEMORIES**

C. M. BAKER (Honeywell, Inc.), T. M. BRIGHT (Honeywell, Inc.), and R. C. CONSTABLE (Honeywell, Inc.)

Aug. 1979

**M-FS-23903**

**Vol. 4, No. 1, p. 100**

Faults in plated wire memories are identified and located from outside of system by applying electrical impulses and analyzing their reflectance in technique of Time-Domain Reflectometry (TDR). Intermittent faults are easier to find because memory system is not disturbed by probing or disassembly.

**B79-10100**

**DETERMINATION OF TOTAL SURFACE REFLECTIVITY**

D. J. DESMET (Univ. of Alabama), A. J. JASON (Univ. of Alabama), and A. C. PARR (Univ. of Alabama)

Aug. 1979

**M-FS-25024**

**Vol. 4, No. 1, p. 102**

Method of measuring total reflectance employs relatively inexpensive reflectometer with gold-coated hemispherical reflector. Light sources may be tungsten lamp for visible region, or Globar lamp for infrared.

**B79-10101**

**CHARACTERIZING GLASS FRITS FOR SLURRIES**

H. N. NAKANO (Lockheed Missiles and Space Co.)

Aug. 1979

**MSC-18322**

**Vol. 4, No. 1, p. 103**

Glass frit can be mixed with consistently reproducible properties even from different batches of glass frit using technique to measure one quantity that determines integrated properties of frit for combination with given liquid.

**B79-10102**  
**TEST-CONFIGURATION IDENTIFIERS**

W. D. SUMRALL (IBM Corp.)

Aug. 1979

**KSC-11087** Vol. 4, No. 1, p. 103

Distributed computer system, which allows great deal of interaction within totally synchronized environment, comprises test system that presents systematic approach for identifying test configurations for large complex systems such as submarines, aircraft, or air traffic controllers.

**B79-10103**  
**ANTITHEFT CONTAINER FOR INSTRUMENTS**

J. J. KERLEY, JR.

Aug. 1979

**GSFC-12399** Vol. 4, No. 1, p. 104

Antitheft container is used to prevent theft of calculators, portable computers, and other small instruments. Container design is simple and flexible enough to allow easy access to display or input systems of instruments, while not interfering with power input to device.

**B79-10104**  
**EXTENDING THE RANGE OF LEAK DETECTORS**

M. E. BURR (Rockwell International Corp.)

Aug. 1979

**M-FS-19411** Vol. 4, No. 1, p. 105

Pressure-gage calibration, mass-spectrometer leak detector measures leakage rates up to 300 times greater than its normal limit. Approach utilizes constant-volume displacement characteristic of mechanical vacuum pump. Vacuum system must be small for calibration measurement validity and reduction of outgassing.

**B79-10105**  
**ATTACHING STRAIN TRANSDUCERS TO FRAGILE MATERIALS**

M. F. DUGGAN (Lockheed Missiles and Space Co.)

Aug. 1979

**MSC-16580** Vol. 4, No. 1, p. 106

A-shaped clamp prevents damage to thin, brittle specimens and supports displacement transducer away from heated zone. Also it defines reference points for strain measurement on specimen surface thus preventing specimen cracking due to unequal thermal expansion between clamp and holder.

**B79-10106**  
**AUDIBLE MONITOR FOR ELECTROPLATING**

E. A. BUROWICK (Rockwell International Corp.)

Aug. 1979

**M-FS-19333** Vol. 4, No. 1, p. 106

'No buzzer' indicates early problem in electroplating when parts are properly immersed into electroplating bath. Buzzer sounds when current flows through part; however, if current is cut, buzzer stops warning that parts must be removed and refinished thus preventing unnecessary waste of electrical energy and labor.

**B79-10107**  
**INSPECTING CRACKS IN FOAM INSULATION**

L. W. CAMBELL (Martin Marietta Corp.) and G. K. JUNG

Aug. 1979

**M-FS-23799** Vol. 4, No. 1, p. 107

Dye solution indicates extent of cracking by penetrating crack and showing original crack depth clearly. Solution comprised of methylene blue in denatured ethyl alcohol penetrates cracks completely and evaporates quickly and is suitable technique for usage in environmental or structural tests.

**B79-10108**  
**MEASURING INSULATION THICKNESS**

D. M. MUNN (Martin Marietta Corp.)

Aug. 1979

**M-FS-23798** Vol. 4, No. 1, p. 108

Calibrated eddy-current meter measures thickness of thermal insulation on metal substrates with specially designed adapters;

for example, thickness of fiberglass parts for boats or automobiles. Technique is particularly useful for sprayed-on insulation.

**B79-10109**  
**BURN-TEST APPARATUS FOR FIBER COMPOSITES**

W. L. DOWLER, J. D. QUINN, K. N. RAMOHALI, and D. E. UDLOCK

Aug. 1979

**NPO-14578** Vol. 4, No. 1, p. 109

Burn-test apparatus made from conductive metal grid and indicator lamp monitors release of conductive carbon fibers from specimen of carbon-reinforced composites exposed to flame. Procedure is more sensitive than photographing or physically trapping and counting fibers.

**B79-10110**  
**MEASURING MOISTURE IN THE ATMOSPHERE**

D. L. JOHNSON

Aug. 1979 See also NASA-TM-78190 (N78-31405)

**M-FS-25032** Vol. 4, No. 1, p. 110

Report describes instruments for measuring moisture in air by categorizing instruments according to their thermodynamic, hygroscopic, condensation, absorption, diffusion, and optical properties.

**B79-10111**  
**FRICTION COEFFICIENTS OF PTFE BEARING LINER**

C. M. DANIELS (Rockwell International Corp.)

Aug. 1979

**M-FS-19389** Vol. 4, No. 1, p. 110

Data discusses frictional characteristics of PTFE (polytetrafluoroethylene) under temperature extremes and in vacuum environment. Tests were also run on reduced scale hardware to determine effects of vacuum. Data is used as reference by designers of aircraft-control system rod-end bearings and for bearings used in polar regions.

**B79-10112**  
**AIRCRAFT MISSION ANALYSIS**

D. S. HAUGE (Aerophysics Research Center) and H. L. ROSENDAAL (Aerophysics Research Center)

Aug. 1979

**LANGLEY-12299** Vol. 4, No. 1, p. 110

Aircraft missions, from low to hypersonic speeds, are analyzed rapidly using the FORTRAN IV program NSEG. Program employs approximate equations of motion that vary in form with type of flight segment. Takeoffs, accelerations, climbs, cruises, descents, decelerations, and landings are considered.

**B79-10113**  
**DYNAMIC SIMULATION AND STABILITY ANALYSIS**

H. P. FRISCH

Aug. 1979

**GSFC-12422** Vol. 4, No. 1, p. 111

Dynamic Interaction Simulation of Controls and Structure (DISCOS) program was developed for dynamic simulation and stability analysis of passive and actively controlled spacecraft. Program is written in FORTRAN IV for batch execution and requires access to finite-element structures program as NASTRAN for flexible-body input data.

**B79-10114**  
**GODDARD TRAJECTORY DETERMINATION**

B. DIXON

Aug. 1979

**GSFC-11946** Vol. 4, No. 1, p. 112

Goddard Trajectory Determination System (GTDS), programs designed to support Earth, lunar and interplanetary missions are used as research and development tool. Program displays research and development used in trajectory determination, preflight and postflight analyses, simulation of tracking data, ephemeris generation, and related tasks.

**B79-10115**  
**MINICOMPUTER VERSION OF SPAR**

O. O. STORAASLI



## 06 MECHANICS

Aug. 1979

**LANGLEY-12370; LANGLEY-12371** Vol. 4, No. 1, p.113

SPAR (Structural Performance Analysis and Redesign Program), powerful tool for efficiently solving finite-element structural analysis problems, has been implemented on minicomputers. System analyzes stress, buckling, vibration, and thermal loads of large linear finite-element structural models.

**B79-10116**

**HINGE-CONNECTED RIGID BODIES**

C. E. FLEISCHER and P. W. LIKINS

Aug. 1979

**NPO-11964**

Vol. 4, No. 1, p. 113

Package of subroutines solve minimum dimension sets of discrete coordinate equations of motion for arbitrary number of hinge-connected rigid bodies assembled in tree topology.

**B79-10117**

**CENTROIDS, MOMENTS, AND RADII OF GYRATION**

R. W. PATCH

Aug. 1979

**LEWIS-12765**

Vol. 4, No. 1, p. 114

Computer program finds area, centroid, moments of inertia, product of inertia, and radii of gyration of closed curve given in graphical form such as on engineering drawing or strip chart. System is applicable when finding volume and center of gravity for liquid tanks, or for detecting buoyancy of hull sections.

**B79-10236**

**ACCURATE DETERMINATION OF WORK IN THREE-POINT BEND TESTS**

R. J. BUZZARD and D. M. FISHER

Dec. 1979 See also NASA-TM-X-73596(N77-19486)

**LEWIS-13034**

Vol. 4, No. 2, p. 249

Article presents procedure where correction curve accounts for coincidental displacement and simplifies data analysis in three point bend test in field of materials testing. Method is applicable to any test in above field regardless of load displacement.

**B79-10237**

**IMPROVED DISPLACEMENT MEASUREMENT IN BEND TESTING**

R. J. BUZZARD and D. M. FISHER

Dec. 1979 See also NASA-TM-X-73596(N77-19486)

**LEWIS-13035**

Vol. 4, No. 2, p. 250

Removable spacers extend displacement range and increase accuracy. Innovation is needed to accurately measure displacement between ram and load applicator of compression testing machine during bend testing.

**B79-10238**

**DISPLACEMENT GAGE MODIFIED FOR MULTIPLE MEASUREMENTS**

R. J. BUZZARD and D. M. FISHER

Dec. 1979 See also NASA-TM-73731(N77-30500)

**LEWIS-13036**

Vol. 4, No. 2, p. 251

Clip-in gages used in fracture toughness testing are modified to permit acquisition of additional displacement data. With innovation, displacement is measured simultaneously at several locations on face of test specimen.

**B79-10239**

**MEASURING THE PERMITTIVITY OF GASES AND AEROSOLS**

W. J. TRETT

Dec. 1979

**KSC-11090**

Vol. 4, No. 2, p. 252

Two-coupler microwave technique measures complex permittivity utilizing waveguide which encloses gas or aerosol. Using technique, blower continuously circulates substances to keep them homogeneous.

**B79-10240**

**IMPROVED SPLIT-FILM VECTOR ANEMOMETER**

J. SCHEIMAN

Dec. 1979

**LANGLEY-12391**

Vol. 4, No. 2, p. 253

Split-film vector anemometer accurately measures magnitude and direction of fluid flow velocity in three-dimensional space using only one of three split films in three-prong split-film system. With procedure, one sensor develops all data previously required by three.

**B79-10241**

**TESTING PANELS IN SHEAR AND BIAXIAL COMPRESSION**

J. K. NEARY (Rockwell International Corp.)

Dec. 1979

**MSC-16132**

Vol. 4, No. 2, p. 254

Hydraulic jacks simultaneously apply torsion, axial compression, and lateral compression to structural panels. Jacks are suitable for testing large panels used in aircraft, lightweight trucks, and buses.

**B79-10242**

**PREDICTING THE WET STRENGTH OF LAMINATES**

R. E. BOHLMAN (McDonnell Douglas Corp.)

Dec. 1979

**MSC-18022**

Vol. 4, No. 2, p. 255

Graphite/epoxy strengths at various moisture contents are estimated by extrapolating from small data base. With procedure, massive testing is unnecessary because advantage is taken of large data base already available for moisture content in laminates.

**B79-10243**

**NONCONTACT STRAIN MEASUREMENT**

P. T. BIZON and F. D. CALFO

Dec. 1979 See also NASA-TM-73886(N78-19161)

**LEWIS-13091**

Vol. 4, No. 2, p. 256

Electro-optical extensometer containing optical and electronic components measures displacement in simulated turbine blade thermally cycled into and out of hot-gas stream. Innovation is useful in obtaining accurate strain histories for components subjected to severe thermal environments and other environmental changes.

**B79-10244**

**THERMOGRAPHIC INSPECTION OF WELDED CONTACTS**

G. L. WORKMAN (North Alabama Scientific & Engineering Consultants, Inc.)

Dec. 1979

**M-FS-25093**

Vol. 4, No. 2, p. 257

Good and poor-quality welds are identified by digitized thermography, an approach which improves reliability of solar arrays on space probes.

**B79-10245**

**NONDESTRUCTIVE WELD TEST BY HOLOGRAPHY**

M. PERRY (North Alabama Scientific & Engineering Consultants, Inc.) and G. L. WORKMAN (North Alabama Scientific & Engineering Consultants, Inc.)

Dec. 1979

**M-FS-23826**

Vol. 4, No. 2, p. 258

Hologram with magnification locates poorly bonded pads on solar cell arrays. Innovation is useful for testing assembly of large solar-cell arrays accurately and nondestructively.

**B79-10246**

**DIAZO TECHNIQUES FOR REMOTE SENSOR DATA ANALYSIS**

S. MOUNT (Missouri Univ. - Rolla) and L. E. WHITEBAY (Missouri Univ. - Rolla)

Dec. 1979 See also NASA-CR-2953(N78-17447)

**M-FS-25110**

Vol. 4, No. 2, p. 259

Cost and time to extract land use maps, natural-resource surveys, and other data from aerial and satellite photographs are reduced by diazo processing. Process can be controlled to enhance features such as vegetation, land boundaries, and bodies of water.

**B79-10247**

**A THERMOCOUPLE FOR HOT, OXIDIZING ENVIRONMENTS**

R. V. JENKINS

Dec. 1979

**LANGLEY-12229**

Vol. 4, No. 2, p. 260

Thermocouple enclosed in nonoxidizing thermally conductive metal provides temperature probe which is made for very hot, highly oxidizing environments. Approach makes temperature measurement in hot, oxidizing atmospheres much easier task.

**B79-10248****AIRPLANE STABILITY PROGRAMS FOR POCKET CALCULATORS**

W. L. SHERMAN

Dec. 1979 See also NASA-TM-78678(N78-30138)

**LANGLEY-12479**

Vol. 4, No. 2, p. 261

Three general-use programs and three stability programs are written for pocket calculators.

**B79-10249****CONTROLLING A WIDE RANGE OF FLOW RATES**

G. S. PERKINS (Caltech)

Dec. 1979

**NPO-14312**

Vol. 4, No. 2, p. 262

Servo-operated valve and two flowmeters allow accurate control over 1,900:1 flow-rate range. It was developed as part of laboratory instrument for measuring properties of confined fluids under conditions analogous to those encountered in deep drilling operations.

**B79-10250****NONINTERFERING SUPPORT FOR AERODYNAMIC MODELS**

S. M. DOLLYHIGH, C. M. JACKSON, JR., and D. S. SHAW

Dec. 1979

**LANGLEY-12441**

Vol. 4, No. 2, p. 262

Metric half-span support increases accuracy of subsonic and supersonic wind-tunnel measurements.

**B79-10251****SOLAR-POWERED JET REFRIGERATOR**

V. W. CHAI (Caltech) and F. L. LANSING (Caltech)

Dec. 1979

**NPO-14550**

Vol. 4, No. 2, p. 263

Design criteria are easily evaluated by tool. Thermodynamic analysis of solar-powered vapor-jet refrigerator combines important performance parameters in nomogram that assist design of practical system. Projected coefficients of performance for different ejector configurations, working fluids, and other design variables are easily obtained from nomogram.

**B79-10252****ESTIMATING EFFECTS OF ACCIDENTAL PROPELLANT EXPLOSIONS**

P. M. ORDIN, W. E. BAKER (Southwest Research Center), P. K. KULESZ (Southwest Research Center), P. K. MOSELEY (Southwest Research Center), V. B. PARR (Southwest Research Center), R. E. RICKER (Southwest Research Center), L. M. VARGAS (Southwest Research Center), and P. S. WESTINE

Dec. 1979 See also NASA-CR-3023(N79-10226); NASA-CR-134906(N76-19296)

**LEWIS-13247**

Vol. 4, No. 2, p. 265

Workbook assesses magnitudes and effects of blasts and fragments from ground system explosions. It provides designer and safety engineer with rapid methods for predicting damage and hazards from explosions of liquid-propellant and compressed-gas vessels used in ground storage, transport, and handling.

**B79-10253****FLOW FIELDS IN SUPERSONIC INLETS**

V. L. SORENSEN

Dec. 1979

**ARC-11098**

Vol. 4, No. 2, p. 265

Flow fields in two and three dimensional axisymmetric supersonic inlets are calculated with computer program that uses method of characteristics to compute array of points in flow field. At each point, local pressure, local Mach number, local flow angle, and static pressure are calculated. Program can be used to design and analyze supersonic inlets by determining surface compression rates and throat flow properties.

**B79-10254****CHARACTERISTICS OF WING/BODY/TAIL CONFIGURATIONS**

M. F. E. DILLENUS (Nielsen Engineering & Research, Inc.), F. K. GOODWIN (Nielsen Engineering & Research, Inc.), D. M. KLINE (Nielsen Engineering & Research, Inc.), and M. R. MENDENHALL (Nielsen Engineering & Research, Inc.)

Dec. 1979

**ARC-11224**

Vol. 4, No. 2, p. 266

Package of computer programs determine longitudinal aerodynamic characteristics of wing/body/tail combinations including effects of nonlinear aerodynamics of components and interference between components.

**B79-10255****ADVANCED-PANEL PILOT CODE**

G. R. BILLS (Boeing Commercial Airplane Co.), M. A. EPTON (Boeing Commercial Airplane Co.), and F. T. JOHNSON (Boeing Commercial Airplane Co.)

Dec. 1979

**ARC-11278**

Vol. 4, No. 2, p. 266

Numerical research program helps establish 'proof-of-concept' for newly developed higher-order panel method applicable to both subsonic and supersonic flows about nearly-arbitrary aircraft configurations. It is intended to solve variety of boundary-value problems in steady-subsonic or supersonic inviscid flow.

**B79-10256****ARBITRARY AIRCRAFT-GEOMETRY GENERATOR**

C. L. W. EDWARDS, W. J. SMALL, and S. H. STACK

Dec. 1979

**LANGLEY-12515**

Vol. 4, No. 2, p. 267

Computer program helps designers to generate detailed configuration geometry with much flexibility in choices of configurations and details of description. Input requirements, program turnaround time, and costs are kept low. It consists of routines that generate fuselage and planar-surface (winglike) geometries and routine that determines true intersection of all components with fuselage.

**B79-10257****RELIABILITY OF NONDESTRUCTIVE EVALUATION DATA**

J. C. COUCHMAN (General Dynamics Corp.) and B. G. W. YEE (General Dynamics Corp.)

Dec. 1979

**LEWIS-12908**

Vol. 4, No. 2, p. 267

Program calculates probability of defects at selected confidence levels from nondestructive evaluation data. It provides alternate method of grouping sample data to obtain reasonable value for lower confidence limit with small sample size.

**B79-10378****IMPROVED FLAW-DETECTION METHOD**

R. J. PLATT, JR.

Apr. 1980

**LANGLEY-11866**

Vol. 4, No. 3, p. 397

Holographic detection of unbonded or delaminated surfaces of materials and structures is improved by using helium instead of air in vacuum test chamber. Helium has index of refraction closer to vacuum (unity) than air. Therefore changes in chamber pressure during test do not alter index of refraction as much as they do with air. With air, much of detail is lost, particularly in curved areas.

**B79-10379****SOLAR-CELL DEFECT ANALYZER**

M. K. GAUTHIER (Caltech), E. L. MILLER (Caltech), and A. SHUMKA (Caltech)

Apr. 1980

**NPO-14476**

Vol. 4, No. 3, p. 398

Laser-Scanning System pinpoints imperfections in solar cells. Entire solar panels containing large numbers of cells can be scanned. Although technique is similar to use of scanning electron microscope (SEM) to locate microscopic imperfections, it differs in that large areas may be examined, including entire

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solar panels, and it is not necessary to remove cover glass or encapsulants.

### B79-10380

#### DETECTING LEAKS IN VACUUM BAGS

E. E. CARLSTROM (Lockheed Missiles and Space Co., Inc.)  
Apr. 1980

### MSC-18423

Vol. 4, No. 3, p. 399

Small leaks in vacuum bag can be readily detected by eye, using simple chemical reaction: combination of ammonia and acetic acid vapors to produce cloudy white smoke. Technique has been successfully used to test seam integrity and to identify minute pinholes in vacuum bag used in assembly of ceramic-tile heat shield for Space Shuttle Orbiter.

### B79-10381

#### CRACK-OPENING DISPLACEMENT TRANSDUCER

R. A. SIMONDS (Vought Corp.)  
Apr. 1980

### LANGLEY-12485

Vol. 4, No. 3, p. 400

Crack-opening displacement transducer consists of 30 deg cone, coil spring, and linear-displacement transducer. Conical probe is used to measure crack opening. Cone is pressed firmly into crack by spring. As applied load causes crack to open up, cone is pushed further into it. Movement of cone, and thus crack growth, is monitored by linear-displacement transducer. Method gives more accurate measurement of crack-opening displacement of very narrow slots.

### B79-10382

#### PEEL TESTING METALIZED FILMS

L. BIVINS (Rockwell International Corp.) and T. SMITH (Rockwell International Corp.)  
Apr. 1980

### NPO-14672

Vol. 4, No. 3, p. 401

Flimsy ultrathin sheets are mounted on glass for peel-strength measurements. Technique makes it easier to perform peel tests on metalized plastic films. Technique was developed for determining peel strength of thin (1,000 A) layers of aluminum on Kapton film. Previously, material has been difficult to test because it is flimsy and tends to curl up and blow away at slightest disturbance. Procedure can be used to measure effects on metalization bond strength of handling, humidity, sunlight, and heat.

### B79-10383

#### GAGE FOR 3-D CONTOURS

C. C. HAYNIE (Rockwell International Corp.)  
Apr. 1980

### MSC-19589

Vol. 4, No. 3, p. 402

Simple gage, used with template, can help inspectors determine whether three dimensional curved surface has correct contour. Gage was developed as aid in explosive forming of Space Shuttle emergency-escape hatch. For even greater accuracy, wedge can be made of metal and calibrated by indexing machine.

### B79-10384

#### AUTOMATIC INSPECTION OF SILICON WAFERS

M. MARTIN (TAI, Inc.)  
Apr. 1980

### M-FS-25124

Vol. 4, No. 3, p. 403

Laser machine scans wafers for contaminating particles which cause open circuits, short circuits, and other defects in integrated circuits and transfers good wafers to integrated circuit processing equipment. Machine is faster and more accurate than human operator using lightfield/dark field microscope.

### B79-10385

#### FAIRED INSTRUMENTATION FOR AERODYNAMIC TESTS

W. C. LONG and M. L. WILLIAMS  
Apr. 1980

### LANGLEY-11201

Vol. 4, No. 3, p. 404

Streamlined package is installed and removed without altering aerodynamic properties of structure being tested. Method uses lightweight materials so that blade balance is maintained.

### B79-10386

#### DEFLECTOMETER FOR PRECRACKED CHARPY AND JIC BEND TESTS

R. T. BUBSEY and M. H. JONES  
Apr. 1980

### LEWIS-13090

Vol. 4, No. 3, p. 404

Deflectometer uses ASTM Standard Test E-399 clip-in displacement gage as sensing element. Gage is available in most fracture testing laboratories and has good sensitivity and accuracy.

### B79-10387

#### ZONE-CONTROLLED RESISTANCE HEATER

P. R. BAGWELL (Vought Corp.)  
Apr. 1980

### MSC-16251

Vol. 4, No. 3, p. 406

Geodesic array of heaters powered by separate electrical supply unit and silicon controlled-rectifier (SCR) control unit produces controlled temperatures over independent zones. Arrays conform to and enclose almost any shape with close thermal coupling and are programmed to reproduce almost any desired time/temperature distribution.

### B79-10388

#### ENERGY SAVER FOR INDUSTRIAL LIGHTING

J. ARLINE (Warren and Williams Associates, Inc.), J. LAPALME (Warren and Williams Associates, Inc.), and C. WARREN (Warren and Williams Associates, Inc.)  
Apr. 1980

### KSC-11103

Vol. 4, No. 3, p. 407

Electronic controller switches lights on or off in response to amount of sunlight available. Is applicable in offices and industrial installations where electrical energy is wasted by using artificial light in sunlit areas. Device utilizes electronic monitor that varies artificial lighting according to amount of sunlight in given area.

### B79-10389

#### COMPACT THERMOCOUPLE REFERENCE FOR VACUUM CHAMBERS

J. C. FAY (Rockwell International Corp.) and J. D. GLOVER (Rockwell International Corp.)  
Apr. 1980

### MSC-19651

Vol. 4, No. 3, p. 408

Self-contained reference installed inside vacuum chamber include its own heater and power controller. Setup is less costly than approach utilizing many thermocouples.

### B79-10390

#### FIBER-OPTIC PROXIMITY SENSOR

A. K. BEJCZY (Caltech), W. A. HERMANN (Caltech), and H. C. PRIMUS (Caltech)  
Apr. 1980

### NPO-14653

Vol. 4, No. 3, p. 408

Proximity sensor for mechanical hand of remote manipulator incorporates fiber optics to conduct signals between light source and light detector. Fiber optics are not prone to noise from electromagnetic interference and radio-frequency interference as are sensors using long electrical cables.

### B79-10391

#### SAFETY SHIELD FOR VACUUM/PRESSURE-CHAMBER WINDOWS

R. A. SHIMANSKY and R. SPENCER  
Apr. 1980

### GSFC-12513

Vol. 4, No. 3, p. 409

Optically-clear shatter-resistant safety shield protects workers from implosion and explosion of vacuum and pressure windows. Plastic shield is inexpensive and may be added to vacuum chambers, pressure chambers, and gas-filling systems.

### B79-10392

#### LIGHTNING PROTECTION FOR AIRCRAFT

F. A. FISHER (General Electric Co.) and J. A. PLUMER (Lightning Technologies, Inc.)  
Apr. 1980 See also NASA-RP-1008 (N78-11024)

### LEWIS-12981

Vol. 4, No. 3, p. 410

Reference book summarizes current knowledge concerning potential lightning effects on aircraft and means available to designers and operators to protect against effects. Book is available because of increasing use of nonmetallic materials in aircraft structural components and use of electronic equipment for control of critical flight operations and navigation.

**B79-10393****FAN NOISE-MODE STRUCTURE IN A DUCT**

R. A. LOVE (Pratt and Whitney Aircraft Group), G. F. PICKETT (Pratt and Whitney Aircraft Group), and R. A. WELLS (Pratt and Whitney Aircraft Group)

Apr. 1980 See also NASA-CR-135295 (N78-17066); NASA-CR-135294 (N78-17065); NASA-CR-135293 (N78-17064)

**LEWIS-13129** Vol. 4, No. 3, p. 411

Two computer programs help analyst meet low-noise limits on turbofan engines. Microphone Location Program computes optimum locations in turbofan duct for placement of microphones. After tests in first program are run, acoustic phase, amplitude, and pressure are used as inputs in Modal Calculation Program.

**B79-10394****ELECTRIC-CAR SIMULATION**

C. P. CHAPMAN (Caltech) and R. A. SLUSSER (Caltech)

Apr. 1980

**NPO-14570** Vol. 4, No. 3, p. 411

PARAMET, interactive simulation program for parametric studies of electric vehicles, guides user through simulation by menu and series of prompts for input parameters. Program considers aerodynamic drag, rolling resistance, linear and rotational acceleration, and road gradient as forces acting on vehicle.

**B79-10395****PHASE CHANGES IN LIQUID FACE SEALS**

W. F. HUGHES (Carnegie-Mellon Univ.)

Apr. 1980

**LEWIS-12994** Vol. 4, No. 3, p. 412

Computer program predicts boiling (phase change) in liquid face seals. Program determines if and when boiling occurs, and calculates location of boiling interface, pressure and temperature profiles, and load.

**B79-10396****COUPLED-CAVITY TRAVELING-WAVE TUBES**

D. J. CONNOLLY and T. A. OMALEY

Apr. 1980

**LEWIS-12861** Vol. 4, No. 3, p. 412

Computer program is developed for analysis of coupled cavity traveling waves tubes (TWT's) which are used in variety of radar and communications applications. Programmers can simulate tubes of arbitrary complexity such as input and output couplers and other features peculiar to one or few cavities which may be modeled by correct choices of input data.

**B79-10397****NATURAL MODES OF HELICOPTER ROTOR BLADES**

R. E. MINECK (U.S. Army R&T Labs.) and W. H. WELLER (U.S. Army R&T Labs.)

Apr. 1980

**LANGLEY-12501** Vol. 4, No. 3, p. 413

Computer program based on Holzer-Myklestad approach calculates coupled vertical, horizontal, and torsional characteristics of wide variety of hub and blade configurations of practical interest. Program is written in FORTRAN IV.

**B79-10398****INTERFERING SURFACES IN SUBSONIC, TRANSONIC, AND SUPERSONIC FLOW**

A. M. CUNNINGHAM, JR. (General Dynamics Corp.)

Apr. 1980

**LANGLEY-12524** Vol. 4, No. 3, p. 413

Computer program provides analysis method based on kernel-function technique that uses assumed pressure functions with unknown coefficients. With technique, generalized forces are calculated in unsteady flow, and pressure distributions are obtained in steady and unsteady flow.

**B79-10399****LOW-ASPECT-RATIO WINGS**

C. E. LAN (Univ. of Kansas Center for Research, Inc.) and S. C. MEHROTRA (Univ. of Kansas Center for Research, Inc.)

Apr. 1980

**LANGLEY-12490** Vol. 4, No. 3, p. 414

Computer program predicts aerodynamic characteristics of wings having attached flow across part of wing and vortex flow across remainder. Program also uses quasi-vortex lattice method to formulate wing boundary conditions.

**B79-10519****TRIPLE-EXPOSURE HOLOGRAPHY FOR MATERIALS TESTS**

H. K. LIU (Lumin, Inc.)

Jun. 1980

**M-FS-25180** Vol. 4, No. 4, p. 521

Theoretical analysis of technique of triple exposure of holographic nondestructive testing shows that significant information can be extracted improving analysis of fringe pattern.

**B79-10520****RESONANT-FATIGUE CRACKING APPARATUS**

J. P. DORNER, W. S. PIERCE, and J. L. SHANNON, JR.

Jun. 1980

**LEWIS-13037** Vol. 4, No. 4, p. 522

Apparatus produces controlled surface cracks in test specimens. It has been developed and is useful in production of surface cracks of controlled size and shape in fracture specimens. It consists of specially-designed stand-mounted clamping fixture, commercially available pneumatic actuator, and suitable sound-control mufflers.

**B79-10521****MEASURING ACOUSTIC PROPERTIES OF MATERIALS AND JET NOZZLES**

P. D. DEAN (Lockheed Aircraft Corp.), H. E. PLUMBLEE (Lockheed Aircraft Corp.), and M. SALIKUDDIN (Lockheed Aircraft Corp.)

Jun. 1980

**LEWIS-13265** Vol. 4, No. 4, p. 523

Method measures acoustic properties of sound-absorbent materials and jet-nozzle system. Advantages of impulse method over other methods are that test time and complication are reduced. Results obtained from impulse method have been compared with those from existing methods, both experimental and theoretical, and show excellent agreement.

**B79-10522****TIRE-PRESSURE MEASURING CONCEPT**

L. O. ASHMORE (Rockwell International Corp.)

Jun. 1980

**MSC-18490** Vol. 4, No. 4, p. 524

External tire-pressure measuring concept involves device that applies external load to tire wall to measure its internal pressure. Method promises to be faster than conventional tire-pressure checks, speeding up turnaround time for aircraft. Method prevents air leakage that occurs when pressure is measured through tire valve. Device is used to measure tire pressures on land vehicles.

**B79-10523****SYNTHETIC SEAWATER AS STRESS-CORROSION TEST MEDIUM**

T. S. HUMPHRIES and E. E. NELSON

Jun. 1980 See also NASA-TM-X-64733(N73-22062)

**M-FS-22706** Vol. 4, No. 4, p. 525

Seawater minimizes pitting corrosion of aluminum-alloy test samples. Of three corrosion-inhibiting methods evaluated using (a) chromate inhibitors in saltwater, (b) surface treating sample via anodizing or alodine treatment, and (c) synthetic seawater, synthetic seawater was most effective test medium, since it is more uniform than fresh seawater.

**B79-10524****DETECTING INSULATION DEFECTS IN METAL/PLASTIC FILMS**

R. N. BUGGLE (Honeywell, Inc.)

Jun. 1980

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**M-FS-25127**

**Vol. 4, No. 4, p. 526**

Simple apparatus checks insulation between plastic and metal surfaces. Film can be inspected more accurately; apparatus can spot minute electrical contaminants between plastic and metal films. Steel roller connected to high-range ohmmeter is guided over entire plastic area of test sample. Roller weighs 2 lbs. (0.9 kg), which effectively translates into 250-psi (1.76X10 to 6th power -N/sq m) contact pressure at plastic surface sufficient to locate microscopic defects.

**B79-10525**

### **ACOUSTICAL MEASUREMENT SEPARATES CORE NOISE AND JET NOISE**

S. P. PARTHASARATHY (Caltech)

Jun. 1980

**NPO-14698**

**Vol. 4, No. 4, p. 526**

Measuring technique discriminates between jet noise and core noise of jet engine. Results of experimentation confirmed that core noise and jet noise can be separated by examining cross-correlation of far-field microphone signals and that crossover point between core noise and jet noise moves toward higher velocities at higher angles with respect to jet axis.

**B79-10526**

### **ONSITE TESTING OF PRESSURE SAMPLING**

R. MALLORY (Wyle Laboratories)

Jun. 1980

**LANGLEY-12428**

**Vol. 4, No. 4, p. 527**

Portable test instrument containing controller, pressure port identification, 5-V power source for transducer excitation, and digital voltmeter to test pressure sampling valves completely, including leak and plug check before, during, or after installation in any location or environment. Controller comprises 117/24-Vac 100-watt transformer, bridge rectifier, capacitive-discharge stepper, and constant voltage source for homing sampling valve. It also includes 5-V regulated power supply and bipolar digital voltmeter having 10-uV resolution.

**B79-10527**

### **GRAPHITE/EPOXY-TAPE TEST SPECIMENS**

J. L. CUPP (Rockwell International Corp.) and F. S. SPEARS (Rockwell International Corp.)

Jun. 1980

**MSC-18495**

**Vol. 4, No. 4, p. 528**

Constructed specimens for tranverse tensile testing of unidirectional graphite/epoxy tape is tested more accurately than earlier samples. Specimens are made using unsupported adhesive and commercially-available (e.g., Nomex, or equivalent) honeycomb core. Flexible adhesive and dimensionally stable core eliminate uneven thermal expansion. Tensile strength of tape at various temperatures becomes direct function of applied mechanical stress.

**B79-10528**

### **'THREE-DIMENSIONAL' VIBRATION FIXTURE**

C. A. SCHUMACHER (Martin Marietta Corp.)

Jun. 1980

**MSC-16305**

**Vol. 4, No. 4, p. 529**

Simple cube-shaped fixture reduces vibration-test time to one-third required previously. Three units are supported at once. During one run each unit is tested along one of axes. Units are repositioned on second run for tests along different axes. Three runs complete test; fixture can be set up to test small, lightweight high-production units.

**B79-10529**

### **RAPID TESTING OF PULSE TRANSFORMERS**

J. GRILLO (Singer Co.)

Jun. 1980

**MSC-18202**

**Vol. 4, No. 4, p. 529**

Quality-control testing of pulse transformers is speeded up by method for determining rise time and droop. Instead of using oscilloscope and square-wave generator to measure these characteristics directly, method uses voltmeter and sine-wave generator to measure them indirectly in about one-tenth time. Droop and rise time are determined by measuring input/output voltage ratio at just four frequencies.

**B79-10530**

### **DETECTOR VERIFIER FOR CIRCUIT ANALYZERS**

D. L. POPE (Rockwell International Corp.) and R. L. WOOTERS (Rockwell International Corp.)

Jun. 1980

**MSC-19669**

**Vol. 4, No. 4, p. 530**

Economical tool checks operation of automatic circuit analyzer. Each loop is addressed directly from analyzer console by switching internal analyzer bridge to resistance equal that of connecting cable plus specified limiting test value. Procedure verifies whether detected faults in circuit under test are actually due to analyzer malfunction. Standard-length universal test cables make it possible to shift detector tool from cable to cable without resistance compensation.

**B79-10531**

### **RUGGED FAST-RESPONSE TEMPERATURE PROBE**

P. L. BAILEY, F. R. LEMOS, and W. C. ROSE

Jun. 1980

**ARC-11289**

**Vol. 4, No. 4, p. 531**

Very-sensitive probe uses tungsten sensor wire wrapped around to notched electrodes. Design combines ruggedness of earlier but less sensitive probe using very-short sensor wire with very-sensitive but fragile version with sensor wires wrapped around non-conducting frames.

**B79-10532**

### **HIGH-TEMPERATURE HIGH-PRESSURE MAGNETIC PICKUP**

L. A. AHLBERG (Rockwell International Corp.) and B. R. TITTMANN (Rockwell International Corp.)

Jun. 1980

**MSC-18389**

**Vol. 4, No. 4, p. 532**

Magnetic-pickup transducers operate at temperature as high as 1,100 C and pressures in excess of 2.5 kilobars. Transducers obtain simulated seismic data in laboratory experiments at high temperatures and pressure. They also have potential applications in industrial instrumentation for measurements under similarly difficult conditions. Transducers use high-temperature cement to bond parts together and high-temperature-insulated copper or aluminum wire for windings.

**B79-10533**

### **CONTROLLING SUBSYNCHRONOUS WHIRL IN TURBOPUMPS**

M. D. BLACK (Rockwell International Corp.) and B. F. ROWAN (Rockwell International Corp.)

Jun. 1980

**M-FS-19423**

**Vol. 4, No. 4, p. 533**

Active fluidic dampers are proposed for controlling turbopump-shaft whirl. Study indicates that linear variable-bleed detector and linear bistable amplifier are effective in supplying sizable controlled damping forces. Linear bistable device was considered as simplest and most adequate.

**B79-10534**

### **MECHANICAL-LOAD INDICATOR**

W. T. APPLEBERRY (Rockwell International Corp.)

Jun. 1980

**MSC-19511**

**Vol. 4, No. 4, p. 534**

By rotation of washerlike part, mechanical indicator shows when predetermined compression or tension load has been reached. Indicator consists of bolt, sleeve, load-indicating washer, and nut. Besides application as load indicator, device has uses as remote indicator of mechanical action. Rotating washer can also act as sequencer, signaling action to begin upon attainment of certain load. It can be used, for example, to initiate work cycle after stored energy has been built up in hydraulic or pneumatic power equipment. It can also be used as remote, nonelectrical switch in hazardous environments.

**B79-10535**

### **ADJUSTABLE HOLDER FOR TRANSDUCER MOUNTING**

R. C. DEOTSCH (Rockwell International Corp.)

Jun. 1980

**MSC-18371**

**Vol. 4, No. 4, p. 535**

Positioning of acoustic sensor, strain gage, or similar transducer is facilitated by adjustable holder. Developed for installation on Space Shuttle, it includes springs for maintaining uniform load on transducer with adjustable threaded cap for precisely controlling position of sensor with respect to surrounding structure.

**B79-10536**  
**AN EVALUATION OF LOW-COST PAYLOAD CARRIER**

V. H. YOST

Jun. 1980

**M-FS-25129**

**Vol. 4, No. 4, p. 536**

Payload carrier designed for space vehicles is essentially cargo carrier that supports, positions, and protects various equipment and materials used in conducting experiments in weightless space environment. Proposed carrier entitled Materials Experiment Assembly II (MEA-II) is considered superior to previously developed models in size, weight, and cost to user. Structure is lightweight with insulated exterior and can be custom sized to meet user needs.

**B79-10537**  
**DETERMINING RADII OF CYLINDRICAL SEGMENTS**

R. J. BUZZARD

Jun. 1980

**LEWIS-12826**

**Vol. 4, No. 4, p. 536**

Simple method determines either inside or outside radius of cylindrical segment when full diametrical section of material is not accessible for caliper measurement or if size, condition, or maneuverability of cylinder is not amenable to use of template or comparator-type devices. Method employs standard micrometer or depth gage with ball-end rod and fixed-length baseplate. Method is more adaptable in variety of situations than are existing methods, and measurements can be obtained under conditions that may be difficult if not impossible using other methods.

**B79-10538**  
**OVERALL LOUDNESS OF STEADY SOUNDS**

W. L. HOWES and V. R. CANRIGHT (U.S. Army Research & Technology Labs.)

Jun. 1980 See also NASA-RP-1001(N79-25753)

**LEWIS-12914**

**Vol. 4, No. 4, p. 537**

Loudness (in sones) and loudness level (in phons) of any sound that is steady for tenths of second can be calculated using computer program derived from new operational theory of loudness. Theory is constructed from psychoacoustic and physiological data on mammalian (monkey) auditory systems. Computer program permits prediction of loudness of any steady sound including, for example, transportation noises, machinery noises, and other environmental noises, with possible additional applications to broadcasting, sound reproduction, establishment and enforcement of noise laws.

**B79-10539**  
**NONLINEAR STRUCTURAL ANALYSIS**

W. E. HAISLER (Texas A&M Research Foundation)

Jun. 1980

**M-FS-25122**

**Vol. 4, No. 4, p. 537**

Development of computer programs for nonlinear structural analyses has progressed from special application programs to large, generalized programs. AGGIE I program is moderately-sized finite-element program that was developed specifically for nonlinear structural analysis. It is based on two- and three-dimensional isoparametric solid elements. AGGIE I accounts for nonlinearities due to large displacements, large strains and nonlinear material behavior.

**B79-10540**  
**REDUNDANT STRUCTURES AT ELEVATED TEMPERATURES**

L. I. GUIDRY (Rockwell International Corp.) and G. H. MINTZ (Rockwell International Corp.)

Jun. 1980

**MSC-18476**

**Vol. 4, No. 4, p. 538**

In many structural systems, it is desirable to perform analysis to determine how safe structure is when subjected to 'yielding'

loads. FRAME 1 computer program analyzes, in both plastic and elastic ranges, redundant structures subjected to thermal and mechanical loads.

**B79-10541**  
**AERODYNAMIC PERFORMANCE OF JET-FLAP WINGS**

G. R. HOUGH (Vought Corp.)

Jun. 1980

**ARC-11215**

**Vol. 4, No. 4, p. 538**

Computer program analyzes performance of jet-flap wings. Fast and easy-to-use prediction technique, it generates accurate solutions for wide range of wing geometries and trailing-edge jet momentum distributions. Analysis is based on optimized vortex-lattice approach and results in rapid convergence of both overall and distributed loadings.

**B79-10542**  
**TRANSONIC FLOW PAST SWEEPED WINGS**

D. A. CAUGHEY (Cornell Univ.) and A. JAMESON (New York Univ.)

Jun. 1980

**LANGLEY-12446**

**Vol. 4, No. 4, p. 539**

FLO-22 computer program aids in numerical analysis of transonic potential flow past lifting, swept wing. FLO-22 uses relaxation method to solve finite-difference approximation of full-potential equation for transonic flow past configuration consisting of wing or arbitrary planform and dihedral extending from symmetry plane or wall. Comparisons of FLO-22 calculated results with experimental data for both conventional and super-critical transport wings show good agreement.

**B79-10543**  
**TRANSONIC AIRFOIL ANALYSIS AND DESIGN**

L. A. CARLSON (Texas A. & M. Univ.)

Jun. 1980

**LANGLEY-12354**

**Vol. 4, No. 4, p. 540**

TRANDES program provides aircraft engineer with accurate and efficient tool for analysis of steady, irrotational, transonic flow over specified two dimensional airfoil in free air. Program is used to design airfoils having prescribed pressure distribution, including effects of weak viscous interaction. TRANDES yield accurate solutions efficiently for biconvex, conventional, and aftcambered airfoils.

**B79-10544**  
**HELICOPTER SLING LOADS**

J. D. SHAUGHNESSY, K. R. YENNI, and T. N. DEAUX (Sperry Rand Corp.)

Jun. 1980

**LANGLEY-12557**

**Vol. 4, No. 4, p. 540**

Computer program compares various control-system concepts for improving handling qualities of single-rotor helicopters carrying relatively-large external sling loads. Computer program developed to test these and other ideas helps to circumvent expensive prototype and field testing. Comparisons between (1) computed data and flight data, (2) simulation-system values and flight test data, and (3) pilot evaluations of simulation and actual-flight conditions are very favorable.

**B79-10545**  
**WING AND LEADING-EDGE THRUST**

H. W. CARLSON and R. J. MACK

Jun. 1980

**LANGLEY-12516**

**Vol. 4, No. 4, p. 541**

Computer program predicts leading-edge thrust for wings of arbitrary planform at supersonic speeds. Methods used in program are based on linearized wing theory. Program first calculates lifting pressures, lift coefficients, drag coefficients, moment coefficients, and lift distributions by using aft-element sensing technique. Next, empirical function calculates set of adjusted pressure-coefficient locations along leading edge. This information is then used to determine limiting value of singularity parameter and value of local leading-edge thrust coefficient.

**B79-10546**  
**SPACECRAFT TRAJECTORY**

## 07 MACHINERY

J. L. HORSEWOOD (Business & Technological Systems, Inc.)  
and F. J. MANN (Business & Technological Systems, Inc.)  
Jun. 1980

**LEWIS-13248** Vol. 4, No. 4, p. 541

Two programs, Hiltop I and Hiltop II, generate optimum trajectory data for electric propulsion missions of interest in exploration of solar system. Propulsion-system logic is activated by single program-input key; program modifications retain Hiltop I within framework of logic, so that Hiltop I input files, will run Hiltop II version and produce identical results as before.

## 07 MACHINERY

**B79-10118**

**ENSURING FLAT CUTS IN LONGWALL MINING**

R. A. CAMPBELL, J. R. CURRIE, E. T. DEATON, and R. R. KISSEL

Aug. 1979

**M-FS-23726** Vol. 4, No. 1, p. 117

Minicomputer-controlled towed vehicle automatically determines flatness of wall of coal or other mineral as it is being cut by mining machine and allows machine operator to correct cut as necessary. Vehicle is used for longwall mining.

**B79-10119**

**FILM-ADVANCE MONITOR**

F. R. DREISBACK, E. T. FREEMAN, and C. W. STUMP

Aug. 1979

**LANGLEY-12474** Vol. 4, No. 1, p. 118

Device checks film advancement in remote cameras by adding optoelectronic sensor and idler sprocket with beam-breaker disk. Monitor is helpful to operators of cameras placed in hostile environments.

**B79-10120**

**PLUG AND DRILL TEMPLATE**

S. ORELLA (Grumman Aerospace Co.)

Aug. 1979

**MSC-16748** Vol. 4, No. 1, p. 119

Device installs plugs and then drills them after sandwich face sheets are in place. Template guides drill bit into center of each concealed plug thereby saving considerable time and fostering weight reduction with usage of smaller plugs.

**B79-10121**

**ANTENNA DEPLOYMENT MECHANISM**

C. R. GRIFFIN and W. A. LEAVY

Aug. 1979

**GSFC-12331** Vol. 4, No. 1, p. 120

All-mechanical antenna deployment system operates by single cable tensioned by electrically driven drum. Device is comprised of set of pulleys fixed to telescoping antenna mast, ratchet which prevents premature antenna retraction, and special latch which holds antenna in retracted position.

**B79-10122**

**REMOTE MANIPULATOR FOR IC WAFERS**

J. L. HUDGINS

Aug. 1979

**M-FS-23846** Vol. 4, No. 1, p. 121

Mechanical manipulator automatically loads, transports, and unloads silicon wafers between processing stations in large-scale integrated-circuit fabrication facility at Marshall Space Flight Center thus eliminating need for human operators at various stages in processing cycle. It also reduces possibility of wafer contamination.

**B79-10123**

**VOLUME-CHANGE INDICATOR FOR MOLDING PLASTIC**

W. C. HELER

Aug. 1979

**LANGLEY-12280**

Vol. 4, No. 1, p. 122

Monitor consisting of two concentric disks measures change in volume of charge during compression/displacement molding. Device enables operator to decide whether process pressure and temperature are set properly or whether sufficient material has been placed in mold.

**B79-10124**

**REMOVABLE FASTENER FOR INSULATING TILES**

J. N. BROWN (Rockwell International Corp.), D. H. CADE (Rockwell International Corp.), and H. A. LOGSTON (Rockwell International Corp.)

Aug. 1979

**MSC-16483** Vol. 4, No. 1, p. 123

Fastening device that consists of internally threaded silica insert, silica plug, and molded rubber retainer, seals holes in ceramic tiles securely over wide temperature excursions without cracking from thermal stresses. Device proves useful in high-temperature industrial applications.

**B79-10125**

**RUBBER VALVE SEAL WITH TOUGH SKIN**

J. W. MARTIN (TRW, Inc.)

Aug. 1979

**LANGLEY-11776** Vol. 4, No. 1, p. 124

Curing technique for producing variable viscosity seal has hard sealing surface supported by softer rubber. Valve seal is clamped between two jaws for curing with hotter jaw at temperature of approximately 350 F and lower at room temperature. Result is durable tight valve-seat.

**B79-10126**

**PARACHUTE DEPLOY/RELEASE MECHANISM**

D. B. ROBELEN

Aug. 1979

**LANGLEY-11575** Vol. 4, No. 1, p. 125

Mechanism operated by signals from single radio-control channel deploy and releases small drogue parachute from flying aircraft. Technique has uses in industrial process control and in recreational hobby applications.

**B79-10127**

**REMOVABLE FASTENER FOR LARGE STRUCTURES**

M. D. THULSON (Martin Marietta Corp.)

Aug. 1979

**M-FS-23990** Vol. 4, No. 1, p. 126

Frame clamps lateral braces for assembling trusses, scaffolds, and other structures. Although approach originally proposed for assembling antennas and solar arrays in space, method is useful in temporary structures which require fastening before they are permanently welded or bonded.

**B79-10128**

**QUARTZ BALL VALVE**

C. GOETZ (Motorola, Inc.) and W. M. INGLE (Motorola, Inc.)

Aug. 1979

**NPO-14473** Vol. 4, No. 1, p. 127

Quartz ball valve consisting of two quartz joints sealed back-to-back and seated in quartz sockets perform at temperatures of up to 1,250 C and in corrosive chemical environments without contamination or degradation.

**B79-10129**

**METALLIC VIBRATION ISOLATORS**

S. BENADO (Sundstrand Corp.) and K. J. HOTZ, JR. (Sundstrand Corp.)

Aug. 1979

**M-FS-23949** Vol. 4, No. 1, p. 127

Woven metallic replacements for rubber isolators withstand heat, vacuum, and thermal shock. Isolators find uses where rubber deteriorates or its mechanical properties are inadequate. Potential applications are in power generators, vehicles, machinery, and portable tools.

**B79-10130****CONTROLLER FOR A STRING ENGINE**

A. R. MCDOUGAL

Aug. 1979

**NPO-14388****Vol. 4, No. 1, p. 128**

Hydraulic mechanism enables operator to adjust power and rotational direction of output of Stirling engine by applying only small force to control lever. Stirling engine has expander and displacer sections.

**B79-10131****PRECISION LEVELING OF LARGE MACHINERY**

H. P. PHILLIPS

Aug. 1979

**NPO-13257****Vol. 4, No. 1, p. 130**

Tool originally developed to level massive circular runners on antennas for communicating with space vehicles is modified to accurately align and level other large machines thus proves faster and more accurate than surveying technique.

**B79-10132****STIFFNESS AND DAMPING OF ELASTOMERIC O-RINGS**

M. S. DARLOW (Mechanical Technology, Inc.), R. K. MEHTA (Mechanical Technology, Inc.), and J. SMALLEY (Mechanical Technology, Inc.)

Aug. 1979 see also NASA-CR-135328 (N78-18460)

**LEWIS-13079****Vol. 4, No. 1, p. 131**

Report presents parameter preturbation test program (using nineteen combinations of Test parameters) for elastomeric O-rings conducting for range of materials, temperatures, amplitudes, squeeze valves, stretch valves, cross-sectional diameters, and groove widths. Tests data were plotted and Power law lines fitted to sets of data.

**B79-10133****ANNULAR ACOUSTIC LINERS FOR TURBOFAN ENGINES**

G. L. MINNER and E. J. RICE

Aug. 1979

**LEWIS-12810****Vol. 4, No. 1, p. 132**

Computer Program (written in FORTRAN IV) for design annular acoustic liners for turbofan engines first estimates noise generated by turbofan engine, then permits methodical examination of alternative choices of noise reduction.

**B79-10258****EXTRA-SAFE TRACTOR-TRAILER COUPLING**

W. P. ALBRECHT and R. H. SPARKS

Dec. 1979

**FR-10081****Vol. 4, No. 2, p. 271**

Built-in safety mechanism for tractor-trailer 'fifth-wheel' coupling keeps rig together in case kingpin failure. Modified coupling utilizes all standard components, such as two wear plates, kingpin, and kingpin latch. It is modified by adding semicircular lip to top wear plate, matching semicircular slot to bottom wear plate, and two latching stop mechanisms.

**B79-10259****LASH-FREE SPHERICAL BEARING**

L. A. HEIN and W. N. MYERS

Dec. 1979

**M-FS-23447****Vol. 4, No. 2, p. 272**

Grooved and chamfered spherical bearing can maintain close contact between its ball and race, even when it is vibrated. Bearing thus eliminates major cause of wear and loosening in spherical bearings: pounding of ball on race under vibration.

**B79-10260****CRYOGENIC-CONTAINER SUSPENSION STRAP**

J. W. VORREITER

Dec. 1979

**ARC-11157****Vol. 4, No. 2, p. 273**

Fiberglass/epoxy supporting strap holds inner shell of cryogenic storage tank away from outer shell. Strap, made of two or more links, reduces heat leakage into cryogenic fluid more efficiently than conventional suspension systems.

**B79-10261****COMPOSITE BEARING LINERS HAVE SERVICE TEMPERATURE OF 600 F**

H. E. SLINEY

Dec. 1979 See also NASA-TM-78935 (N78-26445)

**LEWIS-13277****Vol. 4, No. 2, p. 274**

Self-lubricating graphite-fiber-reinforced polyimide liners for plain bearings raise service temperature from 325 F to 608 F.

**B79-10262****ALL-METAL MUFFLER FOR DUCTS**

P. T. SODERMAN (U. S. Army) and T. D. SCHARTON (Bolt, Beranek &amp; Newman, Inc.)

Dec. 1979

**ARC-11159****Vol. 4, No. 2, p. 275**

Steel- or aluminum-skinned baffles absorb sound from air flowing over them. Because there is no bulk filler, muffler does not collect contaminants. If dirt accumulates on skin, it can be washed away without damaging muffler.

**B79-10263****MULTIPURPOSE SEALS FOR PRESSURE VESSELS**

A. E. BUGGELE

Dec. 1979 See also NASA-TM-X-73680 (N77-28493)

**LEWIS-12944****Vol. 4, No. 2, p. 276**

Cryogenic or multipurpose seals made by using new materials. Seal possesses sufficient flexibility to contain high-pressure fluids regardless of dimensional changes from higher pressure and/or temperature effects. Seal system operates in dual mode. Increased pressure supplements total sealing effort of seal system, which self-compensates for thermal contraction.

**B79-10264****RETAINERS FOR THREADED PARTS**

N. M. DAVIS (Bertea Corp.) and J. L. MANN (Bertea Corp.)

Dec. 1979

**MSC-16198****Vol. 4, No. 2, p. 278**

Retaining ring and fine wire secure nuts or screws reliably. Retainer is easy to assemble and to disassemble, even in confined areas.

**B79-10265****SIMPLE NOISE SUPPRESSOR FOR VENTED HIGH-PRESSURE GAS**

R. G. HUFF

Dec. 1979

**LEWIS-13231****Vol. 4, No. 2, p. 278**

Technique significantly reduces noise level. It uses principle of overexpansion of supersonic jet to create a multiple, strong shock-wave system in pipe, thereby decreasing exit velocity of jet and associated jet-mixing noise.

**B79-10266****BIFUNCTIONAL GAS-FLOW REGULATOR**

E. F. KOCH (Caltech)

Dec. 1979

**NPO-13135****Vol. 4, No. 2, p. 279**

Simple modification converts conventional high-pressure regulator to combination pressure-regulator/shutoff valve. Modification entails adding second diaphragm and pressure compartment. Modified valve is switched between its two functions by external two-position low-pressure valve.

**B79-10267****EXTENDABLE MAST**

J. V. COYNER, JR. (Astro Research Corp.) and J. M. HEDGEPEETH (Astro Research Corp.)

Dec. 1979

**LANGLEY-12078****Vol. 4, No. 2, p. 280**

Extendable mast is constructed from mutually supporting members that unfold as mast is deployed from compact package. Extendable mast is sturdy and can be compared to conventional rigid structures.

**B79-10268****LOW-COST BORING MILL**



## 07 MACHINERY

R. A. HIBDON (Boeing Services International, Inc.)

Dec. 1979

**KSC-11112**

**Vol. 4, No. 2, p. 281**

Portable unit and special fixture serve as boring mill. Machine, fabricated primarily from scrap metal, was designed and set up in about 12 working days. It has reduced setup and boring time by 66 percent as compared with existing boring mills, thereby making latter available for other jobs. Unit can be operated by one man.

**B79-10269**

**BOND GRAPH FOR MODELING VALVES AND SWITCHES**

V. D. GEBBEN

Dec. 1979

**LEWIS-13177**

**Vol. 4, No. 2, p. 282**

Digital graph element represents two-state devices. It can be used in modeling mechanical stops, backlash, and other discontinuities that occur whenever subsystems are connected or disconnected.

**B79-10270**

**EXTRA-STRONG 'FLOATING NUT'**

J. F. CHARLES (Rockwell International Corp.) and H. THEAKSTON (Standard Press Steel)

Dec. 1979

**MSC-16938**

**Vol. 4, No. 2, p. 283**

Increased bearing area withstands much higher torque than previous designs. Floating nut makes it possible to fasten parts on heavy-duty equipment, such as tractors and cranes, even though they can be reached for tightening from one side only.

**B79-10271**

**FOLDABLE BEAM**

R. F. CRAWFORD (Astro Research Corp.)

Dec. 1979 See also B77-10424

**LANGLEY-12076**

**Vol. 4, No. 2, p. 284**

Articulated beam folds into helix around cylindrical hub without segments becoming twisted. Twisting motion that normally occurs when a structure is folded into helix is undesirable in segmented beam because it complicates joints between segments.

**B79-10272**

**ROTATING-SHAFT SEALS**

Innovator not given (Space Propulsion & Power Division of Lewis Research Center) Dec. 1979 See also NASA-SP-8121 (N78-30584)

**LEWIS-13227**

**Vol. 4, No. 2, p. 285**

Monograph organizes and presents significant experience and knowledge accumulated by NASA in development and operational programs. Purpose is to assist designers. It reviews and assesses current design practices and from them establishes guidance for achieving greater consistency in design, increased reliability in end product, and greater efficiency in design effort.

**B79-10273**

**AXIAL-FLOW TURBOPUMPS**

Innovator not given (Space Propulsion & Power Division of Lewis Research Center) Dec. 1979 See also NASA-SP-8125 (N78-31164)

**LEWIS-13228**

**Vol. 4, No. 2, p. 286**

Monograph organizes and presents significant experience and knowledge accumulated by NASA in development and operational programs. It assists system designers. It reviews and assesses current design practices and from them establishes guidance for achieving greater consistency in design, increased reliability in end product, and greater efficiency in design effort.

**B79-10400**

**AUTOMATIC THERMAL SWITCH**

J. W. CUNNINGHAM and L. D. WING

Apr. 1980

**GSFC-12415**

**Vol. 4, No. 3, p. 417**

Automatic thermal switch closes and opens heat-flow path in response to temperature changes. Control is used to regulate

temperature in electronic circuitry or cryogenic refrigeration equipment.

**B79-10401**

**COMPACT ROTARY SEQUENCER**

W. T. APPLEBERRY (Rockwell International Corp.)

Apr. 1980

**MSC-19514**

**Vol. 4, No. 3, p. 418**

Rotary sequencer is assembled from conventional planetary differential gearset and latching mechanism utilizing inputs and outputs which are coaxial. Applications include automated production-line equipment in home appliances and in vehicles.

**B79-10402**

**SEALED-IN-QUARTZ RESISTANCE HEATER**

C. G. MILLER (Caltech) and J. B. STEPHENS (Caltech)

Apr. 1980

**NPO-14529**

**Vol. 4, No. 3, p. 419**

Electric resistance quartz heater operates at 1,400 F without developing excessively hot spots that can fail prematurely. Since resistance element is sealed in quartz, heater can be used in hostile environments. Sealed construction also keeps heater from contaminating heated object.

**B79-10403**

**REMOTELY CONTROLLED LATCH**

C. J. BARNETT (Rockwell International Corp.), P. CASTIGLIONE (Rockwell International Corp.), and L. R. CODA (Rockwell International Corp.)

Apr. 1980

**MSC-18365**

**Vol. 4, No. 3, p. 420**

Mechanism engages and disengages parallel plates carrying couplings and connectors. Designed to lock items in place for handling, storage, or processing under remote control, mechanism has fail-safe feature which does not allow plates to separate completely unless both are supported.

**B79-10404**

**TORQUE-WRENCH EXTENDER FOR HARD-TO-REACH FASTENERS**

S. SELIK (Rockwell International Corp.) and J. A. STEIN (Rockwell International Corp.)

Apr. 1980

**MSC-18488**

**Vol. 4, No. 3, p. 421**

Extension kit for torque wrench tightens and loosens captive fasteners in hard-to-reach places. Kit consists of four universal socket joints and extender rod enclosed in greased-packed tube. Extension kit replaces snap-on adapter and flexible drive shaft.

**B79-10405**

**SLIP SENSOR**

A. K. BEJCZY (Caltech)

Apr. 1980

**NPO-14655**

**Vol. 4, No. 3, p. 422**

Slippage of one surface, relative to another is detected by 'ball bearing' magnetic sensor. Omnidirectional sensor responds to slippage in any direction. Sensor is mounted in 'finger' of mechanical claw manipulator and signals operator who tightens grip by remote control when object slips.

**B79-10406**

**COUPLER FOR REMOTE MANIPULATORS**

A. A. RUDMANN

Apr. 1980

**GSFC-12429**

**Vol. 4, No. 3, p. 423**

Reliable, low-cost coupler aligns and grasps moving and rotating objects. Coupling mechanism may be used in handling of radio-active materials or in underwater explorations and other remote manipulators.

**B79-10407**

**CENTRIFUGAL RECIPROCATING COMPRESSOR**

W. H. HIGH (Caltech)

Apr. 1980

**NPO-14597**

**Vol. 4, No. 3, p. 424**

Efficient compressor uses centrifugal force to compress gas.

System incorporates two coupled dc motors, each driving separate centrifugal reciprocating-compressor assembly. Motors are synchronized to accelerate and decelerate alternately.

**B79-10408**  
**ANGULAR-DISPLACEMENT MECHANISM**

J. A. CALVERT  
Apr. 1980

**MSC-23777** Vol. 4, No. 3, p. 424

Redundant-motor drive system, utilizing two electric motors, generates angular displacement to rotate mechanical or optical components in limited arc. Either motor can drive system while other remains stationary. Since stationary motor is not back-driven, system energy requirement is effectively reduced.

**B79-10409**  
**LONG-WEARING TFE/METAL BEARINGS**

R. A. BRASS (Rockwell Intern. Corp.) and W. A. GILLON, JR. (Rockwell Intern. Corp.)  
Apr. 1980

**MSC-15994** Vol. 4, No. 3, p. 425

Method for making metal/polytetrafluoroethylene (TFE) bearing surfaces embeds long-wearing layer of TFE in microscopic pits in metal. Technique has potential applications in automotive gears, ball joints, and roller chain components. Other applications are in use of unlubricated bearings in chemical, pharmaceutical, and food-processing equipment.

**B79-10410**  
**POSITIVE ISOLATION DISCONNECT**

M. V. FRIEDEL (Martin Marietta Corp.)  
Apr. 1980 See also NASA-CR-144634 (N76-14187)

**MSC-16043** Vol. 4, No. 3, p. 426

Positive-isolation-disconnect (PID) device with two mating halves prevents leakage or spillover when two fluid lines are disconnected. Each half has shutoff poppet to stop fluid flow. When flow is shut, poppets are flush against each other, leaving no space for fluid to remain in.

**B79-10411**  
**HEATED TOOL FOR AUTOCLAVES**

T. T. SERAFINI, R. D. VANUCCI, P. J. CAVANO (TRW, Inc.), and W. E. WINTERS (TRW, Inc.)  
Apr. 1980 See also NASA-CR-135377 (N78-25132)

**LEWIS-12987** Vol. 4, No. 3, p. 427

Components made of composite materials are heated in autoclaves by employing electrical resistance heating blankets, thus avoiding need to heat entire autoclave volume. Method provides not only significant energy savings compared to heating entire pressure vessel but offers time savings in accelerated heat-up and cool-down cycles.

**B79-10412**  
**IMPROVED PISTON RINGS FOR A STIRLING ENGINE**

A. R. MCDOUGAL (Caltech)  
Apr. 1980

**NPO-14497** Vol. 4, No. 3, p. 428

Cast-iron piston rings coated with commercially-available antifriction materials improves cylinder life of high-performance Stirling engine. Ring is efficient heat conductor between piston and cylinder. Device has low thermal expansion which maintains minimum gap in ring, good radial force characteristics, and essentially indefinite life.

**B79-10413**  
**THERMAL SEAL FOR HIGH AND LOW TEMPERATURES**

J. E. COLLIPRIEST, JR. (Rockwell Intern. Corp.) and D. M. FELL (Rockwell Intern. Corp.)  
Apr. 1980

**MSC-16151** Vol. 4, No. 3, p. 429

Composite seal remains flexible between -423 and +500 F. Due to wide temperature capability seal outperforms conventional elastomeric seals used in industrial freezers, environmental chambers, refrigerated trucks and railcars, and aircraft doors.

**B79-10414**  
**FLEXIBLE HEAT-AND-PRESSURE SEAL**

J. BELLAVIA, JR. (Rockwell International Corp.) and J. O. KANE (Rockwell International Corp.)  
Apr. 1980

**MSC-18134** Vol. 4, No. 3, p. 430

Device withstands both heat and pressure and accommodates relative motion between seated surfaces. Seal consists of flexible tube filled with thermally insulating material and coated with pressure resistant materials.

**B79-10415**  
**INSULATING SEAL FOR CRYOGENIC-LIQUID TRANSFER**

I. M. KROENKE (Beech Aircraft Corp.)  
Apr. 1980

**KSC-11105** Vol. 4, No. 3, p. 431

Modification to male bayonet on cryogenic transfer line prevents freezeup of transfer-line coupling and leakage of cryogenic liquid. Procedure helps leakage in plumbing and other cold fluids.

**B79-10416**  
**CRYOGENIC SEAL FOR INSTRUMENT WIRES**

H. V. MASSEY (Federal-Mogul Corp.)  
Apr. 1980

**MSC-18450** Vol. 4, No. 3, p. 431

Seal allows electrical wires to pass directly from sensors inside of liquid nitrogen storage vessel to outside instruments. No splices or connectors are required, so errors created by contact resistance are avoided. With method, measurements with highly sensitive instrumentation are made with greater accuracy.

**B79-10417**  
**STRONG, CORROSION-RESISTANT ALUMINUM TUBING**

M. W. REED (Vought Corp.) and F. F. ADAMS (Vought Corp.)  
Apr. 1980

**MSC-18040** Vol. 4, No. 3, p. 432

When aluminum tubing having good corrosion resistance and postweld strength is needed, type 5083 alloy should be considered. Chemical composition is carefully controlled and can be drawn into thin-wall tubing with excellent mechanical properties. Uses of tubing are in aircraft, boats, docks, and process equipment.

**B79-10418**  
**DYNAMIC-PRESSURE REGULATOR**

R. R. WALKER (Rockwell International Corp.)  
Apr. 1980

**MSC-18415** Vol. 4, No. 3, p. 433

Computerized pressure regulator controls gas pressure in fixed volume container, increasing, maintaining, and decreasing pressure according to programmed instructions. Controller is adaptable to any volume size or shape, and pressure variation may be synchronized.

**B79-10419**  
**BALANCED-FORCE FLOW-REGULATOR VALVE**

W. C. HUBER  
Apr. 1980

**MSC-12731** Vol. 4, No. 3, p. 433

Valve regulates fluid pressure or flow by means of porous barrier and reduces surfaces exposed to liquid or gas flow that cause unbalanced pressure forces. Applications include hand valves, spool valves, and other devices that meter or control gases or liquids.

**B79-10420**  
**IMPROVED WRAP-CURTAIN SEAL**

P. M. SCHROEDER (Rockwell International Corp.)  
Apr. 1980

**MSC-16647** Vol. 4, No. 3, p. 435

Wrapped-curtain thermal seal closes gaps around doors, windows, partitions, and other movable assemblies. Designed for simplicity, seal uses no springs or other mechanical devices and is easily installed on already existing structures.

**B79-10421**  
**ZERO-LEAK VALVE**

## 07 MACHINERY

W. F. MACGLASHAN, JR. (Caltech)

Apr. 1980

**NPO-14717**

**Vol. 4, No. 3, p 435**

Zero-leakage valve has fluid-sealing diaphragm support and flat sievelike sealing surface. Diaphragm-support valve is easy to fabricate and requires minimum maintenance. Potential applications include isolation valve for waste systems and remote air-actuated valve. Device is also useful in controlling flow of liquid fluorine and corrosive fluids at high pressures.

**B79-10422**

**SEPARATION REGION ON BOATTAIL NOZZLES**

J. D. BUTEAU (United Technology Corp.), R. W. KING (United Technology Corp.), and W. M. PRESZ, JR. (United Technology Corp.)

Apr. 1980

**LANGLEY-12453**

**Vol. 4, No. 3, p 436**

Computer subroutine package VISCUS offers flow analyst practical engineering computational procedure to model viscous effects of separated reverse flow on afterbody pressures and drag. Program is written in FORTRAN IV.

**B79-10547**

**HIGH-ACCELERATION CABLE DEPLOYMENT**

C. E. BARNS, T. N. CANNING, B. GIN, R. W. KING, and J. P. MURPHY

Jun. 1980

**ARC-11256**

**Vol. 4, No. 4, p. 545**

Prototype high-acceleration umbilical-cable deployment allows electrical communication between above-ground instrumentation and ballistic projectile below surface. Cable deployment is made up of forebody and afterbody. Forebody can be separated from afterbody by rocket, or they can be fired as unit at target that stops afterbody on impact (forebody would continue, deploying cable). Similar design could be used in study of sea ice and in other surface-penetration studies.

**B79-10548**

**A SIMPLE SELF-SEALING PLUG**

E. P. RUPPE (Rockwell International Corp.)

Jun. 1980

**MSC-19635**

**Vol. 4, No. 4, p. 546**

Inexpensive self-expanding plug makes convenient low-pressure seal. Simple elastomeric plug seals round ports and holes better than regular cork. Plug is inserted with plastic tool that squeezes it to diameter smaller than port opening. Once tool is removed, plug self-expands to its original shape, exerting stronger pressure to sealed surface than cork. Plug is less expensive to make than screw-on or cam-expanded seals.

**B79-10549**

**MINIATURE MOTOR-DRIVEN INSTRUMENT VALVE**

H. L. MINKIN

Jun. 1980

**LEWIS-13195**

**Vol. 4, No. 4, p. 547**

Valve consists of small geared reversible motor, operated by momentary contact closure, which drives shaft with O-rings placed to seal selected ports. Shaft rotates and also moves axially, causing ports to be alternately connected and disconnected. Electrical control of valve is provided by limit switches and relays. Design has advantage over other available valves: less precision machining of parts is required; machining operations are less expensive. Seals are made with O-rings, which are easily replaceable and inexpensive; valve uses less power. It can be used in any application requiring pilot valves for control devices.

**B79-10550**

**FLEXIBLE SLIDING SEAL**

E. L. WALLENHORST (Rockwell International Corp.)

Jun. 1980

**MSC-18467**

**Vol. 4, No. 4, p. 548**

Circular seal both slides and flexes to accommodate relative motion between two sealed members. Originally developed for Space Shuttle orbiter, it contains sliding seal to accommodate engine gimbal and flexible seal that absorbs forward motion at high thrust of engine heat shield relative to airframe. Other

possible applications are in support structures of heavy machinery and vehicle engines. Flexible sliding seal is ring about 7 feet in diameter and can withstand temperatures up to 1,600 F.

**B79-10551**

**IMPROVED TABLE-SAW GUARD**

B. R. DUNN (Rockwell International Corp.) and P. P. ZEBUS (Rockwell International Corp.)

Jun. 1980

**MSC-19550**

**Vol. 4, No. 4, p. 549**

Guard makes lighter contact on materials being sawed. Cuts are better controlled, and damages to fragile foam-type materials are reduced. Overhead support makes it possible to perform slot and step cuts, and thick materials are pushed under guard with less force. Guard is transparent plastic enclosure held by side-attached overhead support arm.

**B79-10552**

**RECIRCULATING SPRAYER FOR FIBER-FILLED PAINTS**

R. K. MAJOR (United Space Boosters, Inc.)

Jun. 1980

**KSC-11146**

**Vol. 4, No. 4, p. 550**

Recirculating paint sprayer applies spray of coarse filler in highly volatile solvent. Sprayer was developed for applying insulation material containing epoxy resin, glass fibers, and inert fillers suspended in chlorinated solvents. Sprayer resists abrasive action of fiberglass filler and chemical activity of solvent. Pump and position ensure more uniform pressure at spray gun without backpressure regulator, which tended to clog in old sprayer.

**B79-10553**

**SCREW/STUD REMOVAL TOOL**

K. DANIELS (Martin Marietta Corp.), D. E. HERRICK (Martin Marietta Corp.), and L. ROTHERMEL (Martin Marietta Corp.)

Jun. 1980

**M-FS-22957**

**Vol. 4, No. 4, p. 550**

Tool removes stubborn panheaded screws or studs where conventional tools would be either too weak or inconvenient to use. Screws with damaged heads or slots can also be removed this way. Tool can be worked with one hand and easily fits limited-access and blind areas. It can be made in various sizes to fit different screwheads.

**B79-10554**

**A TOOL FOR INSTALLATION AND REMOVAL OF CYLINDRICAL BAFFLES**

R. PESSIN (Rockwell International Corp.)

Jun. 1980

**M-FS-19508**

**Vol. 4, No. 4, p. 551**

Simple tool based on principle of automobile oil wrench slips over cylindrical thread-on baffle to install or remove it from baffle assembly. Tool consists of curled metal sheet brazed onto handgrip. Handgrip is adapted to be driven by wrench, ratchet, extension, torque wrench, or some other convenient tool. Clockwise twist of handgrip, tightens metal sheet around baffle to advance it into threaded joint. Counterclockwise twist loosens sheet for repositioning or tool removal.

**B79-10555**

**SIMPLIFIED INSTALLATION OF THRUST BEARINGS**

N. D. SENSENBAUGH (Rockwell International Corp.)

Jun. 1980

**M-FS-19473**

**Vol. 4, No. 4, p. 552**

Special handling sleeve, key to method of installing thrust bearings, was developed for assembling bearings on shaft of low-pressure oxygen turbo-pump. Method eliminates cooling and vacuum-drying steps which saves time, while also eliminating possibility of corrosion formation. Procedure saves energy because it requires no liquid nitrogen for cooling shaft and no natural gas or electric power for operating vacuum oven.

## 08 FABRICATION TECHNOLOGY

**B79-10134****REPAIRING CRACKED GLASS**

D. D. HELMAN (Rockwell International Corp.), J. W. HOLT (Rockwell International Corp.) and L. V. SMISER (Rockwell International Corp.)

Aug. 1979

**KSC-11097**

**Vol. 4, No. 1, p. 135**

Filing procedure consisting of machined lightweight fused-silica tiles coated with thin-layer of borosilicate glass produces homogeneous seal in thin glass. Procedure is useful in repairing glass envelopes, X-ray tub windows, Dewar flasks, and similar thin glass objects.

**B79-10135****FIXTURE FOR LIMITED-ACCESS WELDING**

J. R. TRYON (Rockwell International Corp.)

Aug. 1979

**MSC-16698**

**Vol. 4, No. 1, p. 136**

Fixture consisting of screw-on expansion clamps and backup bar aligns edges of plates for precision butt welding. Tool holds plates securely, without offset, and allows welding and clamp disassembly to be completed when there is access from only one side of structure.

**B79-10136****GIANT-ELECTRODE WELDER**

B. R. ATKINS (Martin Marietta Corp.), R. A. CHIHOSKI (Martin Marietta Corp.), and F. YASHIRO (Martin Marietta Corp.)

Aug. 1979

**LANGLEY-11429**

**Vol. 4, No. 1, p. 137**

Welder produces spot-welds in place of rivets and saves time and money. Unit comprised of conical copper electrode base diameter of 11.5 ft is also capable of welding very thin, hard aluminum alloys.

**B79-10137****FURNACE BRAZING UNDER PARTIAL VACUUM**

R. D. MCKOWN (Rockwell International Corp.)

Aug. 1979

**M-FS-19363**

**Vol. 4, No. 1, p. 138**

Brazing furnace utilizing partial-vacuum technique reduces tooling requirements and produces better bond. Benefit in that partial vacuum helps to dissociate metal oxides that inhibit metal flow and eliminates heavy tooling required to hold parts together during brazing.

**B79-10138****ROOM-TEMPERATURE BONDING OF THIN PLASTIC SHEETS**

R. E. FRAZER

Aug. 1979

**NPO-14346**

**Vol. 4, No. 1, p. 138**

Thin sheets of plastic are bonded together, without heat, by depositing metal films on plastic and applying light pressure. Films are pressed together at room temperature, technique which makes it possible to join organic material without high temperatures necessary for conventional adhesive bonding.

**B79-10139****TEMPORARY INSULATION WITH POLYURETHANE FOAM**

R. G. JACKSON (Rockwell International Corp.) and G. LERMA (Rockwell International Corp.)

Aug. 1979

**MSC-18298**

**Vol. 4, No. 1, p. 139**

Masking parts with Tetrafluoroethylene (TFE) tape allows easy removal of insulation; therefore, insulation can be used temporarily while testing of parts and then removed for their reworking.

**B79-10140****ELECTROPLATING OFFERS EMBRITTLEMENT PROTECTION**

C. M. DANIELS, JR. (Rockwell Intern. Corp.)

Aug. 1970

**M-FS-19330**

**Vol. 4, No. 1, p. 140**

Thin copper electrodeposited layer protects metal parts in environments with which they may be incompatible. Originally developed for main engine of Space Shuttle where high strength nickel alloy bellows must operate in high-pressure hydrogen, technique protects nickel and is unaffected by forming process or subsequent heat treatment and preinstallation processing.

**B79-10141****WINDOW WITH INTEGRAL SEAL**

J. M. BEHAR (Rockwell International Corp.)

Aug. 1979

**MSC-16490**

**Vol. 4, No. 1, p. 140**

Installation concept needed for air tight, water tight, laminated window does away with O-rings and sealants needed for effective edge seal. Pliable inner layer of laminating adhesive extends to form built-in gasket. Technique is usable for plastic or glass windows where space for gaskets and sealing rings is limited, canopies, and shields for military, marine, and land transportation vehicles.

**B79-10142****FASTENING HARDWARE TO HONEYCOMB PANELS**

A. KENGER (Grumman Aerospace Co.)

Aug. 1979

**MSC-16752**

**Vol. 4, No. 1, p. 141**

Adhesive bonding reduces likelihood of skin failure due to excessive forces or torques by utilizing an adhesive to honeycomb skin. Concept is useful in other applications of composites such as aircraft, automobiles, and home appliances.

**B79-10143****VAPOR-DEPOSITED GRADED-THICKNESS FILMS**

H. HERZIG and R. S. SPENCER

Aug. 1979

**GSFC-11806**

**Vol. 4, No. 1, p. 142**

Rotating substrate and slotted mask allow varying film thickness to be deposited from vapor by exposing film substrate to metal vapor through circular mask. Useful for fabricating variable thickness coatings for controlling thermal, electrical, or other properties.

**B79-10144****APPLYING PHOTOSENSITIVE EMULSIONS TO ENAMEL SURFACES**

W. FUHR (U. S. Radium Corp.)

Aug. 1979

**MSC-18107**

**Vol. 4, No. 1, p. 143**

Two layers of lacquer solve problem of adhesion to incompatible surface by spraying panels precoated with enamel paint with varying non-clear lacquers.

**B79-10145****PLASTIC FILM INSULATES SOLAR CELLS FROM METAL SUBSTRATE**

T. C. DVORAK (TRW, Inc.)

Aug. 1979

**M-FS-25007**

**Vol. 4, No. 1, p. 143**

Approach uses polyimide film bonded to aluminum plate using epoxy-impregnated fiberglass cloth as insulating layer. Because film is nonporous, problems due to voids are eliminated.

**B79-10146****CUTTING SILICON FOR SOLAR CELLS**

E. R. COLLINS

Aug. 1979

**NPO-14406**

**Vol. 4, No. 1, p. 144**

Multiple bandsaw blades are used to produce multiple cuts on several silicon boules simultaneously. Method is faster and more reliable than using single saw or multiple-cut reciprocating blades.

## 08 FABRICATION TECHNOLOGY

**B79-10147**

### **FIXTURE FOR ASSEMBLING SOLAR PANELS**

P. A. DILLARD (Lockheed Missiles and Space Co.) and W. M. FRITZ (Lockheed Missiles and Space Co.)  
Aug. 1979

**NPO-14303**

**Vol. 4, No. 1, P. 145**

Vacuum fixture attaches array of silicon solar cells to mounting plate made of clear glass which holds and protects cells. Glass plate transmits, rather than absorbs, solar energy thus cooling cells for efficient operation. Device therefore reduces handling of cells and interconnecting conductors to one operation.

**B79-10148**

### **CMOS CIRCUIT-FABRICATION HANDBOOK**

D. L. BOULDIN, R. W. EASTES, W. R. FELTNER, B. R. HOLLIS, JR., and D. E. ROUTH

Aug. 1979 See also NASA-TM-78188 (N78-78648)

**M-FS-25034**

**Vol. 4, No. 1, p. 146**

Report describes complementary metal-oxide-semiconductor (CMOS) process used to fabricate integrated circuits at Marshall Space Flight Center. It also presents general discussions of circuit design, mask making packaging, and testing.

**B79-10274**

### **ROTATABLE FIXTURE FOR SPRAY COATING**

V. KATVALA, E. PORTER, and M. SMITH

Dec. 1979

**ARC-11110**

**Vol. 4, No. 2, p. 289**

Fixture that rotates about two axes ensures uniform coating and minimizes handling of coated workpiece. Each side of tile is coated in sequence by moving turntables until surface is perpendicular to spray. Process is repeated until desired thickness has built up.

**B79-10275**

### **TOOL CUTS SELF-LOCKING JOINTS IN PLASTICS**

D. F. GOURLEY, S. C. IRICK, and H. H. MARSHALL

Dec. 1979

**LANGLEY-12427**

**Vol. 4, No. 2, p. 290**

Three lathe tools form different joints in gasket material.

**B79-10276**

### **FASTENER FOR EASY INSTALLATION AND REMOVAL OF TILES**

L. H. MALETZ (Rockwell International Corp.)

Dec. 1979

**MSC-16892**

**Vol. 4, No. 2, p. 291**

Mating strips, one with metal hooks and one with metal loops, allow convenient mounting and removal on many kinds of modules. Principle is adaptable to applications where shear-resistant, compliant, removable fastening is needed in hard-to-reach places, especially when attached part is lightly loaded or fragile.

**B79-10277**

### **DISTORTION-FREE FOAMED-PLASTIC PARTS**

P. A. HOGENSON (Rockwell International Corp.) and R. G. JACKSON (Rockwell International Corp.)

Dec. 1979

**ARC-11233**

**Vol. 4, No. 2, p. 292**

In process for molding foamed-plastic products, gases that are formed as byproducts of foaming reaction escape through perforated die. Thus, volatiles are not trapped in pockets that can deform and weaken the molded part.

**B79-10278**

### **VACUUM CASTING OF THICK POLYMERIC FILMS**

E. F. CUDDIHY (Caltech) and J. MOACANIN (Caltech)

Dec. 1979

**NPO-14534**

**Vol. 4, No. 2, p. 292**

Bubble formation and layering, which often plague vacuum-evaporated films, are prevented by properly regulating process parameters. Vacuum casting may be applicable to forming thick films of other polymer/solvent solutions.

**B79-10279**

### **CLEANING CONTAMINATED SUPERALLOY POWDERS**

A. E. ANGLIN

Dec. 1979

**LEWIS-13041**

**Vol. 4, No. 2, p. 293**

Cleaning process reduces level of contaminants in superalloy end product. Procedure has applications to variety of powder metallurgy contamination problems.

**B79-10280**

### **CONFINED EXPLOSIVE JOINING OF TUBES**

L. J. BEMENT

Dec. 1979

**LANGLEY-12248**

**Vol. 4, No. 2, p. 294**

Technique uses explosive ribbon to join and seal tubes hermetically while totally confining explosive products, such as smoke, light, and sound. Only click is audible. Process yields joints of the same strengths as parent metal.

**B79-10281**

### **LOW-COST, HIGH-PERFORMANCE SEPARATOR FOR ALKALINE BATTERIES**

L. HSU, W. H. PHILLIPP, and D. W. SHEIBLEY

Dec. 1979 See also NASA-TP-1407 (N79-21128)

**LEWIS-12972**

**Vol. 4, No. 2, p. 295**

Ion-transporting polymeric films are fabricated by cross-linking polyvinyl alcohols in situ. Major advantage of these strong, more chemically resistant films separators lies in ease of fabrication.

**B79-10282**

### **SPLICING SINGLE-MODE OPTICAL FIBERS**

R. GOLDSTEIN (Caltech) and W. C. GOSS (Caltech)

Dec. 1979

**NPO-14626**

**Vol. 4, No. 2, p. 296**

Approach used to weld multimode fibers has been adapted for more exacting splicing of single-mode fibers. Precision cleaver with tungsten carbide knife edge cuts single-mode optical fibers for welding. Welding apparatus includes micromanipulator, microscopes, and vacuum chucks.

**B79-10283**

### **HIGH-ENERGY-DENSITY CYLINDRICAL CAPACITORS**

R. D. PARKER (Hughes Aircraft Co.) and J. A. ZELIK (Hughes Aircraft Co.)

Dec. 1979 See also NASA-CR-135286 (N78-24458); B79-10284

**LEWIS-12999**

**Vol. 4, No. 2, p. 297**

Manufacturing technique produces high quality metalized-film cylindrical capacitors of energy density greater than 0.1 J/g uncased, using either 24-gage polyvinylidene fluoride or 14-gage polycarbonate film. Components are wound wrinkle-free on hollow PTFE cores, using winding machine that applies constant dynamically controlled tension to film during winding operation.

**B79-10284**

### **HIGH-ENERGY-DENSITY FLAT FLEXIBLE CAPACITORS**

R. D. PARKER (Hughes Aircraft Co.) and J. A. ZELIK (Hughes Aircraft Co.)

Dec. 1979 See also NASA-CR-135286 (N78-24458); B79-10283

**LEWIS-13000**

**Vol. 4, No. 2, p. 298**

Manufacturing technique produces flat flexible capacitors of energy density greater than 0.1 J/g. Exposure of some of metalized surface of each layer provides sufficient film surface to ensure good electrical connection to each layer of capacitor.

**B79-10285**

### **REMOVING OVERCOATINGS FROM MICROCIRCUITS**

J. G. BELCHER, JR., D. P. NICOLAS, and F. VILLELLA

Dec. 1979

**M-FS-23851**

**Vol. 4, No. 2, p. 299**

Silicone resin of elastomer overcoatings are removed more quickly from microcircuit chips with hot concentrated sulfuric acid. Process takes few minutes as compared to day or two, using commercial solvents based on toluene, xylene, and the like. Overcoatings are removed to expose circuit for failure analysis.

**B79-10286****ECONOMICAL SOLDER CONNECTIONS TO THIN FILMS**

J. A. BASS and E. M. GADDY

Dec. 1979

**GSFC-12404****Vol. 4, No. 2, p. 300**

Soldering procedure, successfully tested for attaching leads to silicon solar cells, cover-glasses, is simple, inexpensive, and very effective in forming stable connection. Procedure uses solder of indium alloyed with either silver or tin.

**B79-10287****LIFT-OFF PROCEDURE IMPROVES PATTERN DEFINITION**

H. J. HOVEL (IBM Corp.) and H. A. HUGGINS (IBM Corp.)

Dec. 1979

**LANGLEY-12392****Vol. 4, No. 2, p. 301**

Layer of TiO<sub>2</sub>, economically deposited during integrated circuit fabrication, allows 'nonpattern' metal to be removed cleanly.

**B79-10288****QUALITY CONTROL DURING IC PROCESSING**

Innovator not given (Integrated Circuit Engineering Corp.) Dec. 1979

**M-FS-25112****Vol. 4, No. 2, p. 302**

Manual gives detailed test procedures for controlling silicon-wafer processing in manufacture of integrated circuits. Included among 43 test procedures are: ionic, bacterial, and solids contamination of high-purity water needed for wafer processing; crystallographic reflection, purity, and orientation; substrate dimensions and finish; thickness of deposited epitaxial films; oxide quality; photoresist characteristics; pinholes in insulating layers; metallized adhesion; and quality of ohmic contact.

**B79-10423****FIXTURE FOR WINDING TRANSFORMERS**

M. T. MCLYMAN (Caltech)

Apr. 1980

**NPO-14146****Vol. 4, No. 3, p. 439**

Bench-mounted fixture assists operator in winding toroid-shaped transformer cores. Toroid is rigidly held in place as wires are looped around. Arrangement frees both hands for rapid winding and untangling of wires that occurs when core is hand held.

**B79-10424****FABRICATION OF A PILLOWED AIRBAG**

L. M. LAMBERT (Rockwell Intern. Corp.) and G. OKAMOTO (Rockwell Intern. Corp.)

Apr. 1980

**MSC-18455****Vol. 4, No. 3, p. 439**

Rubber airbag composed of many small air 'pillows' is used as cushion for equipment during shipment. Airbag can also be used to apply uniform pressure to plastics or composites during curing.

**B79-10425****TECHNIQUE FOR MOUNTING PYROELECTRIC DETECTOR ARRAYS**

R. A. BRECKENRIDGE, A. L. FRIPP, and J. B. ROBERTSON

Apr. 1980

**LANGLEY-12363****Vol. 4, No. 3, p. 440**

Technique is developed at Langley Research Center for mounting pyroelectric detector arrays on silicon integrated circuits. Procedure incorporates normal silicon integrated-circuit technology to form quasi-free mounts for detector arrays. Advantages of technique include lower cost, better image registration, and improved reliability.

**B79-10426****REPAIRING CERAMIC INSULATING TILES**

B. R. DUNN (Rockwell Intern. Corp.) and E. L. LAYMANCE (Rockwell Intern. Corp.)

Apr. 1980

**MSC-18368****Vol. 4, No. 3, p. 441**

Fused-silica tiles containing large voids or gauges are repaired without adhesives by plug insertion method. Tiles are useful in

conduits for high-temperature gases, in furnaces, and in other applications involving heat insulation.

**B79-10427****DIMPLING AIRCRAFT SKINS FOR COUNTERSUNK-HEAD RIVETS**

J. G. BARBOUR

Apr. 1980

**LANGLEY-12240****Vol. 4, No. 3, p. 442**

Inexpensive hand-operated tool is used to dimple airframe skins to receive countersunk-head rivets. Tool replaces bulky pneumatic equipment normally used for dimpling and is useful for one person operation, thereby saving time and manpower.

**B79-10428****SAFE BENDING OF BORON/ALUMINUM SHEETS**

G. G. LISKAY (Rockwell Intern. Corp.) and S. Y. YOSHINO (Rockwell Intern. Corp.)

Apr. 1980

**MSC-19525****Vol. 4, No. 3, p. 442**

Low cost procedure utilizing aluminum backing sheets protects boron/aluminum sheet from cracking during bending. Process utilizes inexpensive universal-brake bending dies rather than special hydroforming dies.

**B79-10429****HEAT-SHRINKABLE FILM IMPROVES ADHESIVE BONDS**

J. M. JOHNS (Vought Corp.) and M. W. REED (Vought Corp.)

Apr. 1980

**MSC-18437****Vol. 4, No. 3, p. 443**

Pressure is applied during adhesive bonding by wrapping parts in heat-shrinkable plastic film. Film eliminates need to vacuum bag or heat parts in expensive autoclave. With procedure, operators are trained quickly, and no special skills are required.

**B79-10430****DESIGN RULES FOR CMOS/SOS CIRCUITS**

Innovator not given (Government Systems Division of RCA Corp.) Apr. 1980

**M-FS-25132****Vol. 4, No. 3, p. 444**

Report presents design rules for advanced-technology integrated circuits made by self-aligned silicon-gate complementary - metal - oxide - semiconductor/silicon-on-sapphire (CMOS/SOS)-process.

**B79-10431****CMOS/SOS PROCESSING**

P. RAMONETTA (RCA Corp.)

Apr. 1980

**M-FS-25176****Vol. 4, No. 3, p. 444**

Report describes processes used in making complementary - metal - oxide - semiconductor/silicon-on-sapphire (CMOS/SOS) integrated circuits. Report lists processing steps ranging from initial preparation of sapphire wafers to final mapping of 'good' and 'bad' circuits on a wafer.

**B79-10432****LOW-COST PRODUCTION OF SOLAR-CELL PANELS**

D. B. BICKLER (Caltech), B. D. GALLAGHER (Caltech), and L. E. SANCHEZ (Caltech)

Apr. 1980

**NPO-14453****Vol. 4, No. 3, p. 444**

Large-scale production model combines most modern manufacturing techniques to produce silicon-solar-cell panels of low costs by 1982. Model proposes facility capable of operating around the clock with annual production capacity of 20 W of solar cell panels.

**B79-10433****RF-SPUTTERED AND ION-PLATED SOLID LUBRICANTS**

T. SPALVINS

Apr. 1980 See also NASA-TM-78841 (N78-20333)

**LEWIS-13147****Vol. 4, No. 3, p. 445**

Report reviews advances in tribological uses of RF-sputtered and ion-plated films of solid film lubricants (laminar solids, soft

## 08 FABRICATION TECHNOLOGY

metals, organic polymers) and wear-resistant refractory compounds.

### **B79-10434 PHOTOMASK AND PATTERN PROGRAMS**

R. K. KIRSCHMAN (Caltech)

Apr. 1980

**NPO-14419** Vol. 4, No. 3, p 446

Package of computer programs helps designers with layout and graphics of photomasks. Photomasks are specifically useful to applications involving fine reproducibility, repetition, and fabrication on planar surfaces of materials, items fabricated from photomasks include circuit boards, magnetic bubble devices and integrated optic circuits.

### **B79-10435 SOLAR ARRAY MANUFACTURING INDUSTRY SIMULATION**

R. G. CHAMBERLAIN (Caltech), P. J. FIRNETT (Caltech), and B. KLEINE (Caltech)

Apr. 1980

**NPO-14747** Vol. 4, No. 3, p 446

Solar Array Manufacturing Industry Simulation (SAMIS) program is a standardized model of industry to manufacture silicon solar modules for use in electricity generation. Model is used to develop financial reports that detail requirements, including amounts and prices for materials, labor, facilities, and equipment required by companies.

### **B79-10556 STRESS-RELIEVED SOLDER JOINTS**

C. J. ZEMENICK (Rockwell Intern. Corp.)

Jun. 1980

**MSC-14981** Vol. 4, No. 4, p. 555

Mechanical stress on solder joints is reduced by procedure for soldering electronic components to circuit boards. Procedure was developed for radio-frequency (RF) strip-line circuits, for which dimensions must be carefully controlled to minimize parasitic capacitance and inductance. Procedure consists of loosening component from its mounting after each lead is soldered relieving induced stresses before next soldering step.

### **B79-10557 REPAIRING FLAT CABLES**

Innovator not given (Aerospace Division of Honeywell, Inc.) Jun. 1980

**LANGLEY-11950** Vol. 4, No. 4, p. 556

Simple procedure avoids costly repairs. Cable insulation flaps are cut and peeled back to expose conductor fractures. Insulation layers of decreasing size allow cable to flex without overstressing mended connectors.

### **B79-10558 SCRATCH ENCOURAGES SELECTIVE DOPING**

F. Z. HAWRYLO (RCA Corp.) and H. KRESSEL (RCA Corp.)

Jun. 1980

**LANGLEY-11590** Vol. 4, No. 4, p. 557

Dislocations induced by scratching produce deep narrow spikes of zinc diffused in gallium arsenide. Density of defects formed locally increases zinc diffusion coefficient. Enhancements by factor of 6 have been observed. Technique works for other dopants than zinc and for other semiconductors besides GaAs.

### **B79-10559 WIRE STRIPPER PROTECTS CABLE SHIELDING**

M. A. ECONOMU

Jun. 1980

**FRC-10111** Vol. 4, No. 4, p. 557

Four-blade stripper removes insulation from end or middle of wire without damaging shielding.

### **B79-10560 STITCH-BOND PARALLEL-GAP WELDING FOR IC CIRCUITS**

P. CHVOSTAL (Odetics, Inc.), J. TUTTLE (Odetics, Inc.), and R. VANDERPOOL (Odetics, Inc.)

Jun. 1980

**MSC-16459** Vol. 4, No. 4, p. 558

Stitch-bonded flatpacks are superior to soldered dual-in-lines where size, weight, and reliability are important. Results should interest designers of packaging for complex high-reliability electronics, such as that used in security systems, industrial process control, and vehicle electronics.

### **B79-10561 CRIMPED THERMOCOUPLE CONNECTIONS**

K. L. BILLINGTON (Rockwell Intern. Corp.) and H. S. MAY (Rockwell Intern. Corp.)

Jun. 1980

**MSC-18489** Vol. 4, No. 4, p. 559

When proper procedures are followed, hand crimping tool makes reliable, low-cost thermocouple connections. Procedure reduces time and expense of splicing solid and stranded platinum thermocouple wires.

### **B79-10562 MULTILAYER METALIZATION OF MOS IC'S**

D. L. BOULDIN, W. R. FELTNER, B. R. HOLLIS, JR., and D. E. ROUTH

Jun. 1980

**M-FS-23541** Vol. 4, No. 4, p. 560

Modified ion-bombardment technique interconnects MOS circuit elements without affecting circuit parameters. Multilevel metalization involves: surface treatment prior to metalization; first metalization; metal pattern definition and photoresist removal; dielectric deposition; second metalization; and final dielectric deposition.

### **B79-10563 IMPROVED PROCESS CONTROL FOR VMOS FET'S**

M. D. JHABVALA

Jun. 1980

**GSFC-12515** Vol. 4, No. 4, p. 561

Method is applied in middle of fabrication process: (a) after mask region is formed, diffused-boron region is etched; (b) etching is left incomplete for ion implantation; (c) boron ions are implanted into region to define accurately crucial geometry of V-groove; (d) groove is etched to completion, forming two well-defined diffusion regions that serve as source and drain of transistor. Remaining process is conventional.

### **B79-10564 SECURING CONNECTOR PINS TO A PC BOARD**

D. GRAHAM (Sperry Rand Corp.), R. WILKES (Sperry Rand Corp.), and J. ZORNS (Sperry Rand Corp.)

Jun. 1980

**MSC-16059** Vol. 4, No. 4, p. 561

Solder preforms hold pins firmly to withstand repeated insertion and removal of circuit cards. Advantage is excellent electrical continuity between board circuits and pins.

### **B79-10565 IMPROVED SWITCH-RESISTOR PACKAGING**

R. E. REDMERSKI (Rockwell Intern. Corp.)

Jun. 1980

**MSC-19531** Vol. 4, No. 4, p. 562

Packaging approach makes resistors more accessible and easily identified with specific switches. Failures are repaired more quickly because of improved accessibility. Typical board includes one resistor that acts as circuit breaker, and others are positioned so that their values can be easily measured when switch is operated. Approach saves weight by using less wire and saves valuable panel space.

### **B79-10566 PRECISION SCRIBER**

R. J. BUZZARD

Jun. 1980

**LEWIS-12976** Vol. 4, No. 4, p. 563

Device scribes fine lines to precise tolerances on flat or round surfaces. Scriber is used in conjunction with toolmaker's microscope and will scribe metal of nonmetallic surfaces. When

not in use, scribe is easily retracted or swung out of way so microscope can be used for other purposes.

**B79-10567**

**IMPROVED ACOUSTIC LEVITATION APPARATUS**

L. H. BERGE, J. L. JOHNSON, W. A. ORAN, and D. A. REISS  
Jun. 1980

**M-FS-25050**

**Vol. 4, No. 4, p. 564**

Concave driver and reflector enhance and shape levitation forces in acoustic resonance system. Single-mode standing-wave pattern is focused by ring element situated between driver and reflector. Concave surfaces increase levitating forces up to factor of 6 as opposed to conventional flat surfaces, making it possible to suspend heavier objects.

**B79-10568**

**A PLASMA-SPRAYED VALVE COATING**

A. BRENNAN (Rockwell Intern. Corp.) and A. B. OLMORE (Rockwell Intern. Corp.)

Jun. 1980

**M-FS-19494**

**Vol. 4, No. 4, p. 565**

Need to reduce wear on nickel alloy seats and poppets for Space Shuttle main engine led to fused cobalt/tungsten carbide coating. Coating, which is dense, wear-resistant, and nonporous, can be applied in controlled amounts to various substrate configurations. Ease of application to parts with intricate shapes and contours should make coating useful in automotive and aircraft manufacturing.

**B79-10569**

**INHIBITING OXIDATION OF TUNGSTEN AT HIGH TEMPERATURES**

J. LOMBARD (Rockwell Intern. Corp.) and M. MOYNAHAN (Rockwell Intern. Corp.)

Jun. 1980

**M-FS-19347**

**Vol. 4, No. 4, p. 565**

Coating of mixed ceramics protects tungsten from oxidation. Originally suggested for critical tungsten components on Space Shuttle, mixture consists of 98.5 percent aluminum oxide and 1.5 percent silicon dioxide. It is particularly useful in welding when there is danger that welding arc can burn adjacent components. If coating is applied to nearby tungsten parts, it prevents arcing.

**B79-10570**

**ELECTRODEPOSITION PROCESS REDUCES COST OF COLD PLATES**

E. P. RUPPE (Rockwell Intern. Corp.)

Jun. 1980

**MSC-19524**

**Vol. 4, No. 4, p. 566**

Efficient nickel heat-exchanger cold plates can be fabricated less expensively than stainless steel plates. If adapted to mass production, it is estimated that nickel cold plates might be made for about 30 percent less than stainless-steel plates.

**B79-10571**

**TUBE-SHAPE VERIFIER**

A. N. ANDERSON (Rockwell Intern. Corp.) and C. R. CHRIST (Rockwell Intern. Corp.)

Jun. 1980

**MSC-19623**

**Vol. 4, No. 4, p. 567**

Inexpensive apparatus checks accuracy of bent tubes. Assortment of slotted angles and clamps is bolted down to flat aluminum plate outlining shape of standard tube bent to desired configuration. Newly bent tubes are then checked against this outline. Because parts are bolted down, tubes can be checked very rapidly without disturbing outline. One verifier per tube-bending machine can really speed up production in tube-bending shop.

**B79-10572**

**ADJUSTING AN ELECTRON BEAM FOR DRILLING**

C. L. CHILDRESS (Rockwell Intern. Corp.)

Jun. 1980

**M-FS-19326**

**Vol. 4, No. 4, p. 568**

Reticle contains two concentric circles: inner circle insures

beam circularity and outer circle is guide to prevent beam from cutting workpiece clamp. Precise measurement of beam and clamp are required with old reticle. New reticle speeds up electron-beam drilling process by eliminating need to rotate eyepiece to make measurements against reticle scale.

**B79-10573**

**REPAIRING SEALING SURFACES ON ALUMINUM CASTINGS**

T. L. HANNA (Rockwell Intern. Corp.)

Jun. 1980

**M-FS-19455**

**Vol. 4, No. 4, p. 568**

Approach using stylus nickel plating instead of copper and cadmium plating has simplified repair procedure. Damaged sealing surfaces are stylus nickelplated in one step. Superficial scratches and porous areas are removed more easily from repaired surface by simply lapping sealing areas to required finish. Although method is aimed for aerospace components, it may be easily incorporated into conventional aluminum casting technology. One-step repair can be considered for cast-aluminum automobile and aircraft engines to reduce time and costs.

**B79-10574**

**PROTECTING BRAZING FURNACES FROM AIR LEAKS**

C. T. ARMENOFF (Rockwell Intern. Corp.) and R. D. MCKOWN (Rockwell Intern. Corp.)

Jun. 1980

**M-FS-19379**

**Vol. 4, No. 4, p. 569**

Inexpensive inert-atmosphere shielding protects vacuum brazing-furnace components that are likely to spring leak. Pipefittings, gages, and valves are encased in transparent plastic shroud inflated with argon. If leak develops, harmless argon will enter vacuum chamber, making it possible to finish ongoing brazing or heat treatment before shutting down for repair.

**B79-10575**

**AN IMPROVED WELDING-ARC STARTER**

T. J. TAUFER (Rockwell Intern. Corp.)

Jun. 1980

**MSC-17415**

**Vol. 4, No. 4, p. 570**

Simple circuit modification makes pulse-arc starters more reliable at low currents. Once arc is started, it is maintained at lower voltage level than in previous arrangement due to sufficient concentration of metallic vapor between electrode and working surface as result of improved conduction.

**B79-10576**

**MICROSCOPE FOR HIGH-TEMPERATURE WELDING**

O. E. ACCOUNTIUS (Rockwell Intern. Corp.)

Jun. 1980

**MSC-19572**

**Vol. 4, No. 4, p. 571**

Dark glass in eyepieces lets welder look at fine parts without eye damage. Previously welder had to repair barely visible crack without magnification, because necessary goggles kept eyes too far from microscope eyepieces.

**B79-10577**

**BRAZING TITANIUM TO STAINLESS STEEL**

R. I. BATISTA (TRW, Inc.)

Jun. 1980

**LANGLEY-11441**

**Vol. 4, No. 4, p. 571**

Titanium and stainless-steel members are usually joined mechanically for lack of any other effective method. New approach using different brazing alloy and plating steel member with nickel resolves problem. Process must be carried out in inert atmosphere.

**B79-10578**

**SWITCHBOX FOR WELDING TORCHES**

R. K. BURLEY (Rockwell Intern. Corp.)

Jun. 1980

**M-FS-19354**

**Vol. 4, No. 4, p. 572**

Switchbox can be used to change from one welding torch setup to another without stopping production line. Simple flip of switch connects gas, water, and power to selected torch. In conventional systems, production must be stopped so that maintenance people can disconnect and reconnect another torch.



## 08 FABRICATION TECHNOLOGY

**B79-10579**

### **THERMAL JACK**

C. T. ARMENOFF (Rockwell Intern. Corp.) and R. D. MCKOWN (Rockwell Intern. Corp.)  
Jun. 1980

**M-FS-19365**

**Vol. 4, No. 4, p. 572**

Auxiliary furnace tool forces part to match length of mating part during brazing. As brazed assembly cools, jack contracts faster and disengages from fitting studs.

**B79-10580**

### **VIEWING ELECTRON-BEAM WELDS IN PROGRESS**

C. T. ARMENOFF (Rockwell Intern. Corp.)  
Jun. 1980

**M-FS-19364**

**Vol. 4, No. 4, p. 573**

With aid of optical filter, operator of electron-beam welding machine can view TV image of joint that is being welded and can make corrections as necessary. Operator can see when weld bead gets out of alignment, for example, and compensate for deflection of electron beam caused by changes in magnetic field.

**B79-10581**

### **WELDING MULTIPLE PLIES WITH AN ELECTRON BEAM**

F. J. KILUK (Rockwell Intern. Corp.)  
Jun. 1980

**M-FS-19428**

**Vol. 4, No. 4, p. 574**

Method for electron-beam welding of multi-ply metal sheets eliminates ply separation and minimizes porosity. Method was developed for assembling bellows made of four plies of iron/nickel alloy sheets. Method consists of making successive stitch welds with electron beam until weld seam is completely filled in and all plies have been penetrated.

**B79-10582**

### **BONDING SOFT RUBBER OR PLASTICIZED ELASTOMERS TO METAL**

J. M. CLEMONS, F. E. LEDBETTER, III, and W. T. WHITE  
Jun. 1980

**M-FS-25181**

**Vol. 4, No. 4, p. 574**

Approach using bond-cover coat of unplasticized rubber between soft rubber and adhesive eliminates diffusion problem. Approach is useful in making improved seals in automobile engines, industrial and public plumbing, and in other areas using soft-rubber-to-metal bonds. Seals and gaskets made this way would not have to be replaced very often, reducing cost of maintenance.

**B79-10583**

### **VACUUM-AND-PRESSURE LAMINATING POLYMER MATERIALS**

D. R. HOFFMAN and T. J. RILEY  
Jun. 1980

**LEWIS-12721**

**Vol. 4, No. 4, p. 575**

Lamination setup is used to produce void-free bonds by first employing vacuum to outgas materials and adhesive at temperature below curing temperature and then subjecting assembly to pressure and temperature necessary to cure.

**B79-10584**

### **EVACUATED-DISPLACEMENT COMPRESSION MOLDING**

W. C. HEIR  
Jun. 1980

**LANGLEY-12523**

**Vol. 4, No. 4, p. 576**

Compression-molding process comprises: loading molding compound; evacuation; applying pressure to shape softened compound; further compressing while using compound as hydraulic fluid; and applying heat and pressure for cure. Major advantage of method is that it prevents increase in cavity volume (sporadic or general) throughout transformation phase of molding.

**B79-10585**

### **ELECTROMAGNETIC BONDING OF PLASTICS TO ALUMINUM**

A. T. SHEPPARD (Martin Marietta Corp.) and L. SILBERT (Martin Marietta Corp.)  
Jun. 1980

**M-FS-25083**

**Vol. 4, No. 4, p. 577**

Electromagnetic curing is used to bond strain gage to aluminum tensile bar. Electromagnetic energy heats only plastic/metal interface by means of skin effect, preventing degradation of heat-treated aluminum. Process can be easily applied to other metals joined by high-temperature-curing plastic adhesives.

**B79-10586**

### **STRUCTURALLY-CONTINUOUS COMPOSITE CORNERS**

A. C. JACKSON (Lockheed Aircraft Corp.) and J. A. VANHAMERSVELD (Lockheed Aircraft Corp.)

Jun. 1980

**LANGLEY-11942**

**Vol. 4, No. 4, p. 578**

Flat composite materials are cut at certain angles to form boxes with corners as thick as walls. Patterns produce uniform corners, and cuts are structured so that shear loads are transferred from ply to ply instead of across one surface.

**B79-10587**

### **REMOVING BONDED SKIN FROM A SUBSTRATE**

E. N. CHARTIER (Rockwell Intern. Corp.)  
Jun. 1980

**MSC-19664**

**Vol. 4, No. 4, p. 579**

Metal skin is peeled off like sardine-can cover with key. Method is useful in removing bonded skins from any substrate where substrate is strong enough not to buckle or tear when bonded skin is rolled free. Also, it is useful for removing sections of damaged skin where bladders of other equipment below substrate might be damaged if saw or router were used to cut completely through skin.

**B79-10588**

### **ARC-TERMINATION CRACKS IN INCONEL 718 AND INCOLOY 903**

E. BAYLESS, J. MCCAIG, and R. POORMAN  
Jun. 1980

**M-FS-25089**

**Vol. 4, No. 4, p. 579**

Four-phase study was launched to determine welding conditions conducive to crater cracks and to establish procedures for fixing them. Results of study are published in brief report.

**B79-10589**

### **COST SAVINGS IN LSI FABRICATION**

R. P. HIMMEL (Hughes Aircraft Co.), S. SALMASSY (Hughes Aircraft Co.), and S. M. STUHLBARG (Hughes Aircraft Co.)  
Jun. 1980

**M-FS-25079**

**Vol. 4, No. 4, p. 580**

One year study program was divided into three tasks: to identify costs factors involved in packaged electronic subsystems as function of LSI density and reliability; to select most promising factors that might be modified to reduce costs in high-density packaging; and to investigate cost-saving beam tape technology for producing high-volume discrete-device packages. Results are published in 67 page report.

## 09 MATHEMATICS AND INFORMATION SCIENCES

**B79-10149**

### **ESTIMATING THE COST OF PRODUCTION STOPPAGE**

L. M. DELIONBACK

Aug. 1979 See also NASA-TM-78131 (N77-34044)

**M-FS-23884**

**Vol. 4, No. 1, p. 149**

Estimation model considers learning curve quantities, and time of break to forecast losses due to break in production schedule. Major parameters capable of predicting costs are number of units made prior to production sequence, length of production break, and slope of learning curve produced prior to break.

**B79-10150**
**INEXPENSIVE LAND-USE MAPS EXTRACTED FROM SATELLITE DATA**

T. W. BARNEY (Missouri Univ.), D. J. BARR (Missouri Univ.), C. D. ELIFRITS (Missouri Univ.), and C. J. JOHANNSEN (Missouri Univ.)

Aug. 1979

**M-FS-25111**
**Vol. 4, No. 1, p. 150**

Satellite images are interpretable with minimal skill and equipment by employing method which uses false color composite print of image of area transmitted from Landsat satellite. Method is effective for those who have little experience with satellite imagery, little time, and little money available.

**B79-10151**
**LANDSAT AND WATER POLLUTION**

P. CASTRUCCIO (Ecosystems Intern., Inc.), T. FOWLER (Ecosystems Intern., Inc.), and H. LOATS, JR. (Ecosystems Intern., Inc.)

Aug. 1979

**M-FS-25099**
**Vol. 4, No. 1, p. 150**

Report presents data derived from satellite images predicting pollution loads after rainfall. It explains method for converting LANDSAT images of eastern United States into cover maps for Baltimore/five county region.

**B79-10152**
**ANALYZING EARTH'S SURFACE DATA**

D. J. BARR (Missouri Univ.) and C. D. ELIFRITS (Missouri Univ.)

Aug. 1979

**M-FS-25051**
**Vol. 4, No. 1, p. 152**

Manual discusses simple inexpensive image analysis technique used to interpret photographs and scanner of data of Earth's surface. Manual is designed for those who have no need for sophisticated computer-automated analysis procedures.

**B79-10153**
**REDUNDANT SYSTEM RELIABILITY ANALYSIS**

C. J. MASRELIEZ (Boeing Co.)

Aug. 1979

**LANGLEY-12069**
**Vol. 4, No. 1, p. 152**

Computer Aided Redundant System Reliability Analysis (CARSARA) program facilitates reliability assessment of fault-tolerance reconfigurable systems. CARSARA accounts for influences from transient faults and is used to model wide range of redundancy management strategies.

**B79-10289**
**PROGRAMING TECHNIQUES FOR CDC EQUIPMENT**

J. R. NEWSOM (Vought Corp.) and S. H. TIFFANY (Vought Corp.)

Dec. 1979 See also NASA-CR-3033 (N78-28832)

**LANGLEY-12486**
**Vol. 4, No. 2, p. 305**

Five techniques reduce core requirements for fast batch turnaround time and interactive-terminal capability. Same techniques increase program versatility, decrease problem-configuration dependence, and facilitate interprogram communication.

**B79-10290**
**COMPARING DATA TRANSMISSION SYSTEMS**

R. F. RICE (Caltech)

Dec. 1979

**NPO-14642**
**Vol. 4, No. 2, p. 305**

Scheme for coding and compressing data signals for transmission are compared by new analytical technique. Transmission rate of several schemes are plotted for direct comparison and evaluation.

**B79-10291**
**ANNUITY-ESTIMATING PROGRAM**

D. W. JILLIE

Dec. 1979

**ARC-11139**
**Vol. 4, No. 2, p. 307**

Program computes benefits and other relevant factors for Federal Civil Service employees. Computed information includes retirement annuity, survivor annuity for each retirement annuity,

highest average annual consecutive 3-year salary, length of service including credit for unused sick leave, amount of deposit and redeposit plus interest.

**B79-10292**
**MULTIPURPOSE INTERACTIVE NASA INFORMATION SYSTEM**

J. M. HILL (Computer Sciences Corp.), R. L. KEEFER (Computer Sciences Corp.), D. R. SANDERS (Computer Sciences Corp.), and R. N. SEITZ (Computer Sciences Corp.)

Dec. 1979

**M-FS-23753**
**Vol. 4, No. 2, p. 307**

Multipurpose Interactive NASA Information System (MINIS) is data management system capable of retrieving descriptive data from LANDSAT photos. General enough to be used with other user-defined data bases, interactive data management and information retrieval system was especially developed for small and medium-sized computers. It uses free-form data base that allows one to create entirely new and different data bases and to control format of output products.

**B79-10293**
**MODEL FOR REFINING OPERATIONS**

D. N. DUNBAR (Gordian Associates, Inc.) and B. G. TUNNAH (Gordian Associates, Inc.)

Dec. 1979

**LEWIS-13047**
**Vol. 4, No. 2, p. 308**

Program predicts production volumes of petroleum refinery products, with particular emphasis on aircraft-turbine fuel blends and their key properties. It calculates capital and operating costs for refinery and its margin of profitability. Program also includes provisions for processing of synthetic crude oils from oil shale and coal liquefaction processes and contains highly-detailed blending computations for alternative jet-fuel blends of varying endpoint specifications.

**B79-10436**
**REVISED ADAGE GRAPHICS COMPUTER SYSTEM**

J. S. TULPPO (Sperry Rand Corp.)

Apr. 1980

**LANGLEY-12492**
**Vol. 4, No. 3, p. 449**

Bootstrap loader and mode-control options for Adage Graphics Computer System significantly simplify operations procedures. Normal load and control functions are performed quickly and easily from control console. Operating characteristics of revised system include greatly increased speed, convenience, and reliability.

**B79-10437**
**COMPILER VALIDATES UNITS AND DIMENSIONS**

F. E. LEVINE (IBM Corp.)

Apr. 1980

**KSC-11054**
**Vol. 4, No. 3, p. 449**

Software added to compiler for automated test system for Space Shuttle decreases computer run errors by providing offline validation of engineering units used system command programs. Validation procedures are general, though originally written for GOAL, a free-form language that accepts 'English-like' statements, and may be adapted to other programming languages.

**B79-10438**
**A FLEXIBLE DATA BASE**

E. R. COLE (Caltech), S. N. HIGGINS (Caltech), and R. L. WATSON (Caltech)

Apr. 1980

**NPO-13777**
**Vol. 4, No. 3, p. 450**

Report describes hierarchical multilevel, multientry-point data file, and methodology of developing such file for unit-record-oriented system. Data base structure was prepared for Goldstone Energy Project where it is used in analyzing past energy consumption, predicting future consumption, and aiding design of buildings.

**B79-10439**
**COMPUTING TIME- AND FREQUENCY-DOMAIN ANALYSIS**

J. D. BROWNLOW

## 09 MATHEMATICS AND INFORMATION SCIENCES

Apr. 1980

**FRC-10121**

**Vol. 4, No. 3, p 451**

Computer program Spectrum Analysis is developed to perform wide range statistical-estimation functions. It is rigorous tool for time-and frequency-domain studies. Program is written in FORTRAN IV.

**B79-10440**

**LINEAR CONTINUOUS AND SAMPLED-DATA SYSTEMS**

J. W. EDWARDS

Apr. 1980

**FRC-10114**

**Vol. 4, No. 3, p 451**

Program performs general analysis of linear and continuous, discrete and sampled-data systems using state-variable techniques. Program is especially suited analysis of linearized control system problems. It also can be used to model system described by combination of differential equations and Laplace transform blocks, such as aircraft control system.

**B79-10441**

**MASS PROPERTIES OF A RIGID STRUCTURE**

J. L. GILBERT, R. A. HULL, and P. J. KLICH

Apr. 1980

**LANGLEY-12454**

**Vol. 4, No. 3, p 451**

Program MASPROM rapidly calculates mass properties of complex, rigid structural systems. Its basic premise is that complex systems can be adequately described by combination of basic elementary structural shapes.

**B79-10442**

**IMAGE-ANALYSIS LIBRARY**

Innovator not given (College of Science of Texas A. & M. University) Apr. 1980

**MSC-18178**

**Vol. 4, No. 3, p 452**

MATHPAC image-analysis library is collection of general purpose mathematical and statistical routines and special-purpose data-analysis and pattern-recognition routines for image analysis. MATHPAC library consists of Linear Algebra, Optimization, Statistical-Summary, Densities and Distribution, Regression, and Statistical-Test packages.

**B79-10443**

**MODERN PROGRAMMING LANGUAGE**

G. H. FELDMAN (Caltech) and J. A. JOHNSON (Caltech)

Apr. 1980

**NPO-14105**

**Vol. 4, No. 3, p 452**

Structural-programming language is especially tailored for producing assembly language programs for MODCOMP II and IV mini-computers. Modern programming language consists of set of simple and powerful control structures that include sequencing alternative selection, looping, sub-module linking, comment insertion, statement continuation, and compilation termination capabilities.

**B79-10590**

**OPTICAL COMPARATOR USES HOLOGRAPHIC SUBTRACTION**

D. W. VAHEY (Battelle Memorial Inst.) and C. M. VERBER (Battelle Memorial Inst.)

Jun. 1980 See also NASA-CR-2829 (N77-28471)

**LANGLEY-12126**

**Vol. 4, No. 4, p. 583**

Integrated optical comparator compares reference and signal voltages by their effects on coherent light beam. If both voltages are same, beam is essentially unperturbed. If voltages differ, light is deflected by previously recorded hologram to detector.

**B79-10591**

**NUMERICAL ANALYSIS OF COMPLEX FLUID-FLOW SYSTEMS**

R. L. HOLLAND (McDonnell Douglas Corp.)

Jun. 1980

**M-FS-25125**

**Vol. 4, No. 4, p. 584**

Very flexible computer-assisted numerical analysis is used to solve dynamic fluid-flow equations characterizing computer-controlled heat dissipation system developed for Spacelab. Losses caused by bends, ties, fittings, valves, and like are easily included,

and analysis can solve both steady-state and transient cases. It can also interact with parallel thermal analysis.

**B79-10592**

**GENERALIZED PLOTTING AND CONTOURING PACKAGE**

D. RUBIN (Computer Sciences Corp.)

Jun. 1980

**GSFC-12367**

**Vol. 4, No. 4, p. 584**

PLOTPAK is complete general purpose plotting and contouring package. Flexible and easy-to-use system, it produces line-printer, television-screen, and DICOMED plots. Plots, from quick and simple to complex and sophisticated, can be generated with only basic knowledge of FORTRAN and PLOTPAK commands.

**B79-10593**

**VITERBI/ALGEBRAIC HYBRID DECODER**

R. W. BOYD (Mississippi State Univ.), F. M. INGELS (Mississippi State Univ.), and C. MO (Mississippi State Univ.)

Jun. 1980

**M-FS-25095**

**Vol. 4, No. 4, p. 585**

Decoder computer program is hybrid between optimal Viterbi and optimal algebraic decoders. Tests have shown that hybrid decoder outperforms any strictly Viterbi or strictly algebraic decoder and effectively handles compound channels. Algorithm developed uses syndrome-detecting logic to direct two decoders to assume decoding load alternately, depending on real-time channel characteristics.

# SUBJECT INDEX

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MSC-18437 B79-10429 08

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Wing and leading-edge thrust

LANGLEY-12516 B79-10545 06

### AERODYNAMIC CONFIGURATIONS

Low-aspect-ratio wings  
LANGLEY-12490 B79-10399 06

### AERODYNAMIC DRAG

Separation region on boattail nozzles  
LANGLEY-12453 B79-10422 07

### AERODYNAMIC HEAT TRANSFER

Improved wrap-curtain seal  
MSC-16647 B79-10420 07

### AERODYNAMIC LOADS

A closed-loop control-loading system  
LANGLEY-12167 B79-10029 02  
Noninterfering support for aerodynamic models  
LANGLEY-12441 B79-10250 06  
Aerodynamic performance of jet-flap wings  
ARC-11215 B79-10541 06

### AERODYNAMIC NOISE

Advanced-panel pilot code  
ARC-11278 B79-10255 06

### AERODYNAMICS

Flow fields in supersonic inlets  
ARC-11098 B79-10253 06

### AEROSOLS

Thermoluminescence analysis of aerosols  
LANGLEY-12046 B79-10208 04  
Instrument for aerosol characterization  
NPO-14320 B79-10209 04  
Measuring the permittivity of gases and aerosols  
KSC-11090 B79-10239 06

### AFTERBODIES

Separation region on boattail nozzles  
LANGLEY-12453 B79-10422 07

### AGRICULTURE

Solar energy for industrial process heat  
NPO-14498 B79-10064 03

### AILERONS

Structurally-continuous composite corners  
LANGLEY-11942 B79-10586 08

### AIR CARGO

Helicopter sling loads  
LANGLEY-12557 B79-10544 06

### AIR CONDITIONING

No-reheat air-conditioning  
GSFC-12191 B79-10330 03  
Residential solar-heating/cooling system  
M-FS-25166 B79-10339 03  
Final report on the concentric-tube solar collector  
M-FS-25188 B79-10342 03

### AIR CONDITIONING EQUIPMENT

Ozone inhibits corrosion in cooling towers  
NPO-14340 B79-10362 04

### AIR DUCTS

All-metal muffler for ducts  
ARC-11159 B79-10262 07

**AIR FLOW**

- Electrical indication of airflow rate
  - M-FS-23873 B79-10090 06
- Collector performance at various air-channel depths
  - M-FS-25159 B79-10343 03

**AIR POLLUTION**

- Burning crude oil without pollution
  - NPO-14344 B79-10078 04
- Thermoluminescence analysis of aerosols
  - LANGLEY-12046 B79-10208 04
- Instrument for aerosol characterization
  - NPO-14320 B79-10209 04
- Remote measurement of atmospheric pollutants
  - LANGLEY-12277 B79-10210 04
- Monitoring harmful gases
  - KSC-11086 B79-10211 04

**AIRCRAFT**

- Aircraft mission analysis
  - LANGLEY-12299 B79-10112 06

**AIRCRAFT CONFIGURATIONS**

- Arbitrary aircraft-geometry generator
  - LANGLEY-12515 B79-10256 06

**AIRCRAFT DESIGN**

- Characteristics of wing/body/tail configurations
  - ARC-11224 B79-10254 06
- Interfering surfaces in subsonic, transonic, and supersonic flow
  - LANGLEY-12524 B79-10398 06

**AIRCRAFT ENGINES**

- Stiffness and damping of elastomeric O-rings
  - LEWIS-13079 B79-10132 07

**AIRCRAFT INSTRUMENTS**

- LED display for solo aircraft instrument navigation
  - LANGLEY-12292 B79-10023 02

**AIRCRAFT NOISE**

- Faired instrumentation for aerodynamic tests
  - LANGLEY-11201 B79-10385 06
- Fan noise-mode structure in a duct
  - LEWIS-13129 B79-10393 06

**AIRCRAFT SAFETY**

- Lightning protection for aircraft
  - LEWIS-12981 B79-10392 06

**AIRCRAFT STABILITY**

- Airplane stability programs for pocket calculators
  - LANGLEY-12479 B79-10248 06

**AIRCRAFT STRUCTURES**

- Laser alignment of large assemblies
  - MSC-19346 B79-10097 06
- Giant-electrode welder
  - LANGLEY-11429 B79-10136 08
- Dimpling aircraft skins for countersunk-head rivets
  - LANGLEY-12240 B79-10427 08

**AIRCRAFT TIRES**

- Tire-pressure measuring concept
  - MSC-18490 B79-10522 06

**AIRFOILS**

- Transonic airfoil analysis and design
  - LANGLEY-12354 B79-10543 06

**AIRFRAME MATERIALS**

- Temperature and moisture analysis in composites
  - LANGLEY-12452 B79-10373 04

**ALGORITHMS**

- Viterbi/algebraic hybrid decoder
  - M-FS-25095 B79-10593 09

**ALIGNMENT**

- Laser alignment of large assemblies
  - MSC-19346 B79-10097 06

- Precision leveling of large machinery
  - NPO-13257 B79-10131 07
- Adjusting an electron beam for drilling
  - M-FS-19326 B79-10572 08

**ALKALINE BATTERIES**

- Low-cost, high-performance separator for alkaline batteries
  - LEWIS-12972 B79-10281 08

**ALLOYS**

- Fatigue properties of columbium alloy
  - MSC-18256 B79-10225 04
- Composites of immiscible metals
  - M-FS-23816 B79-10508 04

**ALUMINUM**

- Low absorptance porcelain-on-aluminum coating
  - M-FS-23879 B79-10077 04
- Giant-electrode welder
  - LANGLEY-11429 B79-10136 08

**ALUMINUM ALLOYS**

- Stress corrosion in high-strength aluminum alloys
  - M-FS-23986 B79-10372 04
- Strong, corrosion-resistant aluminum tubing
  - MSC-18040 B79-10417 07
- Safe bending of boron/aluminum sheets
  - MSC-19525 B79-10428 08
- Shear strength of aluminum fillet welds
  - M-FS-23946 B79-10511 04
- Synthetic seawater as stress-corrosion test medium
  - M-FS-22706 B79-10523 06

**ALUMINUM OXIDES**

- Controlled metal-film deposition on alumina substrates
  - ARC-11214 B79-10080 04

**ALUMINUM SILICATES**

- Fibrous refractory composite insulation
  - ARC-11169 B79-10224 04

**AMMONIA**

- Remote measurement of atmospheric pollutants
  - LANGLEY-12277 B79-10210 04

**AMPLIFIERS**

- Limiting amplifier for microwaves
  - MSC-18471 B79-10314 01
- Rise-time control in saturated amplifiers
  - MSC-14934 B79-10452 01

**ANAEROBES**

- Fuel gas from biodigestion
  - M-FS-23957 B79-10042 03

**ANALOG DATA**

- Obtaining an electrical output from a mechanical flowmeter
  - M-FS-23958 B79-10087 06

**ANALOG TO DIGITAL CONVERTERS**

- Real-time video-image analysis
  - NPO-14282 B79-10018 02
- Offset compensation for A/D converters
  - NPO-13438 B79-10163 01
- Variable-clock-rate A/D converter
  - MSC-18541 B79-10309 01

**ANALYZERS**

- Detector verifier for circuit analyzers
  - MSC-19669 B79-10530 06

**ANALYZING**

- Aircraft mission analysis
  - LANGLEY-12299 B79-10112 06

**ANEMOMETERS**

- Improved split-film vector anemometer
  - LANGLEY-12391 B79-10240 06

**ANGIOGRAPHY**

- Computer measurement of arterial disease
  - NPO-14266 B79-10377 05

**ANGLES (GEOMETRY)**

- Angular-displacement mechanism
  - M-FS-23777 B79-10408 07

**ANGULAR RESOLUTION**

- Azimuth correlator for synthetic aperture radar
  - NPO-14019 B79-10020 02

**ANTENNA ARRAYS**

- Interferometer antenna-array system
  - GSFC-12365 B79-10323 02

**ANTENNA COMPONENTS**

- Antenna deployment mechanism
  - GSFC-12331 B79-10121 07

**ANTENNA COUPLERS**

- Components for an S-band communication subsystem
  - NPO-13955 B79-10022 02

**ANTENNA DESIGN**

- Efficient dichroic plate for microwaves
  - GSFC-12171 B79-10002 01
- Azimuth correlator for synthetic aperture radar
  - NPO-14019 B79-10020 02
- Signal separator for dual-frequency antenna
  - NPO-14022 B79-10021 02
- Dual hybrid mode feed horn
  - NPO-13594 B79-10168 02

**ANTENNA FEEDS**

- Low-backlobe microwave transmitting horn
  - NPO-14077 B79-10003 01

**ANTENNA RADIATION PATTERNS**

- Low-backlobe microwave transmitting horn
  - NPO-14077 B79-10003 01
- Analysis of aperture antenna radiation pattern
  - MSC-16246 B79-10066 03

**ANTENNAS**

- Efficient dichroic plate for microwaves
  - GSFC-12171 B79-10002 01
- Signal separator for dual-frequency antenna
  - NPO-14022 B79-10021 02
- Limited scan dual-band high-gain antenna
  - NPO-14038 B79-10167 02
- Wide-beam flush-mounted antenna
  - MSC-16800 B79-10169 02
- Extendable mast
  - LANGLEY-12078 B79-10267 07
- Low-profile communications antenna
  - MSC-16683 B79-10321 02
- Dual-frequency microwave antenna
  - NPO-13091 B79-10322 02

**ANTHROPOMETRY**

- Anthropometric sourcebook
  - MSC-18500 B79-10234 05

**ARC WELDING**

- An improved welding-arc starter
  - MSC-17415 B79-10575 08
- Arc-termination cracks in inconel 718 and incoloy 903
  - M-FS-25089 B79-10588 08

**AROMATIC COMPOUNDS**

- Synthesis of triaryltrifluoroethanes
  - ARC-11097 B79-10217 04

**ARRAYS**

- Limited scan dual-band high-gain antenna
  - NPO-14038 B79-10167 02

- Technique for mounting pyroelectric detector arrays  
 LANGLEY-12363 B79-10425 08
- ARTERIOSCLEROSIS**  
 Computer measurement of arterial disease  
 NPO-14266 B79-10377 05
- ASSEMBLING**  
 Assembling solar-cell arrays  
 NPO-14416 B79-10037 03  
 Fixture for assembling solar panels  
 NPO-14303 B79-10147 08  
 Switchbox for welding torches  
 M-FS-19354 B79-10578 08
- ASSEMBLY LANGUAGE**  
 Modern programming language  
 NPO-14105 B79-10443 09
- ASTRONAVIGATION**  
 SKYMAP star catalog  
 GSFC-12445 B79-10205 03
- ASTRONOMICAL CATALOGS**  
 SKYMAP star catalog  
 GSFC-12445 B79-10205 03
- ASTRONOMICAL PHOTOMETRY**  
 Sensor/amplifier for weak light sources  
 M-FS-25025 B79-10449 01
- ASTRONOMICAL TELESCOPES**  
 High-resolution spectrometer  
 NPO-14372 B79-10328 03
- ATMOSPHERIC MOISTURE**  
 Measuring moisture in the atmosphere  
 M-FS-25032 B79-10110 06
- ATMOSPHERIC PRESSURE**  
 Microwave measurement of atmospheric pressure  
 NPO-14450 B79-10333 03
- ATMOSPHERIC TEMPERATURE**  
 Rugged fast-response temperature probe  
 ARC-11289 B79-10531 06
- ATTENUATORS**  
 Low-frequency attenuator circuit  
 FRC-11012 B79-10010 01  
 Voltage-controlled attenuator with low phase shift  
 NPO-14347 B79-10301 01
- ATTITUDE (INCLINATION)**  
 Hinge-connected rigid bodies  
 NPO-11964 B79-10116 06
- ATTITUDE CONTROL**  
 SKYMAP star catalog  
 GSFC-12445 B79-10205 03
- AUDIO FREQUENCIES**  
 TV audio and video on the same channel  
 MSC-16241 B79-10017 02
- AUDITORY DEFECTS**  
 Teletype test unit  
 LANGLEY-12527 B79-10166 02
- AUDITORY PERCEPTION**  
 Overall loudness of steady sounds  
 LEWIS-12914 B79-10538 06
- AUTOClaves**  
 Heated tool for autoclaves  
 LEWIS-12987 B79-10411 07
- AUTOMATIC CONTROL**  
 Multiple-camera automatic controller  
 LEWIS-12711 B79-10175 02  
 Automatic inspection of silicon wafers  
 M-FS-25124 B79-10384 06
- AUTOMATIC GAIN CONTROL**  
 Decision-directed automatic gain control  
 NPO-13639 B79-10008 01  
 Digital automatic gain control  
 NPO-14236 B79-10304 01
- AUTOMATIC TEST EQUIPMENT**  
 Binary synchronous simulator  
 KSC-11096 B79-10479 02  
 Detector verifier for circuit analyzers  
 MSC-19669 B79-10530 06
- AUTOMOBILES**  
 Use of composites in electric vehicles  
 NPO-14615 B79-10226 04  
 Electric-car simulation  
 NPO-14570 B79-10394 06
- AVALANCHE DIODES**  
 Fiber-optic crossbar switch  
 KSC-11104 B79-10006 01  
 Low-noise current regulator  
 NPO-14070 B79-10011 01  
 JANTX/N937B Zener diode  
 M-FS-15247 B79-10460 01  
 JANTX/N972B zener diode  
 M-FS-25248 B79-10461 01  
 JANTX/N98B Zener diode  
 M-FS-25249 B79-10462 01  
 JANTX1N4570A zener diode  
 M-FS-25268 B79-10465 01
- AXIAL FLOW PUMPS**  
 Axial-flow turbopumps  
 LEWIS-13228 B79-10273 07
- AZIMUTH**  
 Azimuth correlator design for IC chip  
 NPO-14614 B79-10451 01
- B**
- BACKGROUND NOISE**  
 Improved InSb photodiode preamplifier circuit  
 NPO-14418 B79-10007 01
- BACKLOBES**  
 Low-backlobe microwave transmitting horn  
 NPO-14077 B79-10003 01
- BACTERIA**  
 Fuel gas from biodigestion  
 M-FS-23957 B79-10042 03  
 Platinum electrodes for electrochemical detection of bacteria  
 LANGLEY-12462 B79-10228 05
- BACTERIOLOGY**  
 Identification of micro-organisms  
 MSC-18358 B79-10085 05
- BAFFLES**  
 All-metal muffler for ducts  
 ARC-11159 B79-10262 07  
 A tool for installation and removal of cylindrical baffles  
 M-FS-19508 B79-10554 07
- BALL BEARINGS**  
 Lash-free spherical bearing  
 M-FS-23447 B79-10259 07
- BALLS**  
 Quartz ball valve  
 NPO-14473 B79-10128 07
- BEAM SPLITTERS**  
 Fabricating wedge-shaped beam splitters  
 GSFC-12348 B79-10326 03
- BEAMS (SUPPORTS)**  
 Foldable beam  
 LANGLEY-12076 B79-10271 07
- BEARINGS**  
 Friction coefficients of PTFE bearing liner  
 M-FS-19389 B79-10111 06  
 Lash-free spherical bearing  
 M-FS-23447 B79-10259 07
- Composite bearing liners have service temperature of 600 F  
 LEWIS-13277 B79-10261 07  
 Long-wearing TFE/metal bearings  
 MSC-15994 B79-10409 07
- BELLOWS**  
 Welding multiple plies with an electron beam  
 M-FS-19428 B79-10581 08
- BENDING**  
 Safe bending of boron/aluminum sheets  
 MSC-19525 B79-10428 08  
 Tube-shape verifier  
 MSC-19623 B79-10571 08
- BENDING FATIGUE**  
 Fatigue properties of columbian alloy  
 MSC-18256 B79-10225 04
- BENDING MOMENTS**  
 Accurate determination of work in three-point bend tests  
 LEWIS-13034 B79-10236 06  
 Improved displacement measurement in bend testing  
 LEWIS-13035 B79-10237 06  
 Deflectometer for precracked charpy and jic bend tests  
 LEWIS-13090 B79-10386 06
- BIBLIOGRAPHIES**  
 An annotated energy bibliography  
 LANGLEY-12488 B79-10065 03
- BINARY ALLOYS**  
 Single-, two-, and three-phase binary-alloy systems  
 LANGLEY-12381 B79-10514 04
- BINARY DATA**  
 Binary-to-Manchester encoders  
 MSC-16546 B79-10157 01
- BIOINSTRUMENTATION**  
 Coupler for surgery on small animals  
 ARC-11114 B79-10230 05
- BIRTH**  
 Monitoring fetal pH by telemetry  
 GSFC-12507 B79-10517 05
- BOATTAILS**  
 Separation region on boat tail nozzles  
 LANGLEY-12453 B79-10422 07
- BODY FLUIDS**  
 Extracting trace substances from biological fluids  
 MSC-18522 B79-10516 05
- BODY KINEMATICS**  
 Dynamic simulation and stability analysis  
 GSFC-12422 B79-10113 06
- BODY MEASUREMENT (BIOLOGY)**  
 Low-dose total-body-calcium analysis  
 MSC-18282 B79-10233 05  
 Anthropometric sourcebook  
 MSC-18500 B79-10234 05
- BOILERS**  
 Performance test for a solar water heater  
 M-FS-25114 B79-10055 03  
 Fluidized coal combustion  
 NPO-14273 B79-10070 04
- BOLTS**  
 Retainers for threaded parts  
 MSC-16198 B79-10264 07  
 Extra-strong 'floating nut'  
 MSC-16938 B79-10270 07
- BONDING**  
 Room-temperature bonding of thin plastic sheets  
 NPO-14346 B79-10138 08

**BONES**

Low-dose total-body-calcium analysis  
MSC-18282 B79-10233 05

**BORING MACHINES**

Low-cost boring mill  
KSC-11112 B79-10268 07

**BORON REINFORCED MATERIALS**

Safe bending of boron/aluminum sheets  
MSC-19525 B79-10428 08

**BOULES**

Cutting silicon for solar cells  
NPO-14406 B79-10146 08

**BOUNDARY LAYER SEPARATION**

Separation region on boattail nozzles  
LANGLEY-12453 B79-10422 07

**BRAZING**

Furnace brazing under partial vacuum  
M-FS-19363 B79-10137 08  
Electrodeposition process reduces cost of cold plates  
MSC-19524 B79-10570 08  
Protecting brazing furnaces from air leaks  
M-FS-19379 B79-10574 08  
Brazing titanium to stainless steel  
LANGLEY-11441 B79-10577 08  
Thermal jack  
M-FS-19365 B79-10579 08

**BUBBLE MEMORY DEVICES**

Bubble-domain detector  
LANGLEY-12241 B79-10306 01

**BUDGETING**

Annuity-estimating program  
ARC-11139 B79-10291 09

**BUILDINGS**

Analysis of building heating and cooling  
NPO-14683 B79-10067 03

**BURNERS**

Flat-flame burner  
LEWIS-13161 B79-10218 04

**BURNING TIME**

Burn-test apparatus for fiber composites  
NPO-14578 B79-10109 06

**BURNS (INJURIES)**

Microcomputer helps evaluate skin burns  
NPO-14402 B79-10082 05  
Improved capacitive EKG electrode  
MSC-18321 B79-10232 05

**BUTT JOINTS**

Fixture for limited-access welding  
MSC-16698 B79-10135 08

**BYPASSES**

Improved isolation in double-balanced mixers  
NPO-14415 B79-10012 01

**C****CABLES**

Cable-fault locator  
KSC-10899 B79-10024 02  
Simpler cabling and power link for remote readouts  
GSFC-12411 B79-10028 02

**CADMIUM SULFIDES**

CdInP semiconductor alloy  
LANGLEY-12405 B79-10491 03

**CALCIFICATION**

Low-dose total-body-calcium analysis  
MSC-18282 B79-10233 05

**CALCIUM**

Low-dose total-body-calcium analysis  
MSC-18282 B79-10233 05

**CALCULATORS**

Airplane stability programs for pocket calculators  
LANGLEY-12479 B79-10248 06

**CALIBRATING**

Self-calibrating threshold detector for noisy signals  
MSC-16370 B79-10009 01  
Proposed Josephson voltage standard  
M-FS-23845 B79-10482 03

**CALORIMETERS**

Containerless high-temperature calorimeter  
M-FS-23923 B79-10086 06

**CAMERAS**

Film-advance monitor  
LANGLEY-12474 B79-10119 07  
Multiple-camera automatic controller  
LEWIS-12711 B79-10175 02

**CANCER**

Wideband electronics for ultrasonic tissue characterization  
NPO-14461 B79-10229 05

**CAPACITANCE**

Improved insulator layer for MIS devices  
LANGLEY-12455 B79-10302 01  
Measuring charge nonuniformity in MOS devices  
NPO-14585 B79-10308 01

**CAPACITORS**

Improved metalized polycarbonate capacitor  
M-FS-25142 B79-10156 01  
High-energy-density cylindrical capacitors  
LEWIS-12999 B79-10283 08  
High-energy-density flat flexible capacitors  
LEWIS-13000 B79-10284 08

**CARBON COMPOUNDS**

Burn-test apparatus for fiber composites  
NPO-14578 B79-10109 06

**CARBON FIBER REINFORCED PLASTICS**

Determining resin/fiber content of laminates  
LANGLEY-12442 B79-10216 04  
Graphite/epoxy-tape test specimens  
MSC-18495 B79-10527 06

**CARCINOGENS**

Thermoluminescence analysis of aerosols  
LANGLEY-12046 B79-10208 04

**CARDIOVASCULAR SYSTEM**

Trifunctional transducer for myocardial monitoring  
NPO-14329 B79-10518 05

**CARRIER INJECTION**

Improved degradation resistance of (AlGa)As lasers  
LANGLEY-12242 B79-10486 03

**CASES (CONTAINERS)**

Antitheft container for instruments  
GSFC-12399 B79-10103 06

**CASSEGRAIN ANTENNAS**

Limited scan dual-band high-gain antenna  
NPO-14038 B79-10167 02

**CASTING**

Vacuum casting of thick polymeric films  
NPO-14534 B79-10278 08

**CATALYSTS**

Controlled metal-film deposition on alumina substrates  
ARC-11214 B79-10080 04  
Detecting oxygen in hydrogen or hydrogen in oxygen  
MSC-18380 B79-10365 04

**CAULKING**

Heat- and chemical-resistant oxadiazole elastomers  
ARC-11253 B79-10355 04

**CENTER OF GRAVITY**

Accurate measurements of mass and center of mass  
NPO-14428 B79-10095 06  
Mass properties of a rigid structure  
LANGLEY-12454 B79-10441 09

**CENTRIFUGAL PUMPS**

Centrifugal reciprocating compressor  
NPO-14597 B79-10407 07

**CENTRIFUGES**

Improved optics for an ultracentrifuge  
NPO-13657 B79-10375 05

**CENTROIDS**

Accurate measurements of mass and center of mass  
NPO-14428 B79-10095 06  
Centroids, moments, and radii of gyration  
LEWIS-12765 B79-10117 06

**CERAMIC COATINGS**

Low absorptance porcelain-on-aluminum coating  
M-FS-23879 B79-10077 04  
Repairing ceramic insulating tiles  
MSC-18368 B79-10426 08  
Longer shelf life for ceramic slurries  
MSC-18543 B79-10510 04  
Inhibiting oxidation of tungsten at high temperatures  
M-FS-19347 B79-10569 08

**CERAMICS**

Characterizing glass frits for slurries  
MSC-18322 B79-10101 06  
Repairing cracked glass  
KSC-11097 B79-10134 08

**CERTIFICATION**

Certification tests on the solar-powered pump  
M-FS-25144 B79-10201 03  
Certification of the concentrating solar collector  
M-FS-25220 B79-10345 03

**CHARACTERIZATION**

Characterizing glass frits for slurries  
MSC-18322 B79-10101 06

**CHARGE COUPLED DEVICES**

Reliability of imaging CCD's  
M-FS-25039 B79-10013 01  
Electronic pictures from charged-coupled devices  
GSFC-12324 B79-10015 02

**CHARGE DISTRIBUTION**

Measuring charge nonuniformity in MOS devices  
NPO-14585 B79-10308 01

**CHARGE TRANSFER**

Preionized discharge for short-wavelength laser  
NPO-13945 B79-10186 03

**CHARPY IMPACT TEST**

Deflectometer for precracked charpy and jic bend tests  
LEWIS-13090 B79-10386 06

**CHEMICAL COMPOSITION**

Instrument for aerosol characterization  
NPO-14320 B79-10209 04

**CHEMICAL REACTORS**

A reactor for more efficient solar cells  
NPO-14381 B79-10074 04  
Chemical-vapor-deposition reactor  
NPO-14137 B79-10075 04  
Quartz ball valve  
NPO-14473 B79-10128 07  
New approach to purifying silicon  
NPO-14474 B79-10367 04  
Compact reactor for onboard hydrogen generation  
LEWIS-13033 B79-10368 04

**CHLOROPHYLLS**

Marine chlorophyll a analysis  
LANGLEY-12293 B79-10048 03

**CHRONOPHOTOGRAPHY**

Cinemicrographic specimen housing  
LANGLEY-12047 B79-10231 05

**CINEMATOGRAPHY**

Cinemicrographic specimen housing  
LANGLEY-12047 B79-10231 05

**CIRCUIT BOARDS**

Repairing flat cables  
LANGLEY-11950 B79-10557 08

**CIRCUIT BREAKERS**

Solid-state power controller  
MSC-16661 B79-10300 01

**CIRCUIT PROTECTION**

Minimizing spikes in switching-regulator circuits  
NPO-14505 B79-10303 01  
Surge protection with automatic reset  
MSC-18356 B79-10305 01  
Overload protection for switching regulators  
MSC-18513 B79-10450 01

**CIRCUIT RELIABILITY**

Low-noise current regulator  
NPO-14070 B79-10011 01  
Reliability of imaging CCD's  
M-FS-25039 B79-10013 01  
Removing overcoatings from microcircuits  
M-FS-23851 B79-10285 08

**CIRCUITS**

Burn-test apparatus for fiber composites  
NPO-14578 B79-10109 06

**CIRCULAR POLARIZATION**

Wide-beam flush-mounted antenna  
MSC-16800 B79-10169 02

**CIRCULATORY SYSTEM**

High-resolution echocardiography  
NPO-14349 B79-10081 05

**CLAMPS**

Attaching strain transducers to fragile materials  
MSC-16580 B79-10105 06  
Fixture for limited-access welding  
MSC-16698 B79-10135 08

**CLEAN ENERGY**

Burning crude oil without pollution  
NPO-14344 B79-10078 04

**CLEANING**

Continuous sterilization of plumbing systems  
KSC-11085 B79-10079 04  
Precise wet-chemical etching  
NPO-14339 B79-10364 04

**CLOSED CIRCUIT TELEVISION**

Viewing electron-beam welds in progress  
M-FS-19364 B79-10580 08

**CLOUDS (METEOROLOGY)**

Meteorological data-processing package  
GSFC-12372 B79-10206 03

**CLUTTER**

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All-digital QPSK modulator  
MSC-16922 B79-10320 02

Digital generation of command-encoder waveforms  
GSFC-12203 B79-10478 02

**DIMENSIONAL ANALYSIS**  
Compiler validates units and dimensions  
KSC-11054 B79-10437 09

**DIMPLING**  
Dimpling aircraft skins for countersunk-head rivets  
LANGLEY-12240 B79-10427 08

**DIODES**  
JANTX1N645-1 diode  
M-FS-25243 B79-10456 01  
JANTX1N649-1 diode  
M-FS-25344 B79-10457 01  
JANTX/N746A diode  
M-FS-25245 B79-10458 01  
JANTX/N759A voltage regulating diode  
M-FS-25246 B79-10459 01  
JANTX/N937B Zener diode  
M-FS-15247 B79-10460 01  
JANTX/N972B zener diode  
M-FS-25248 B79-10461 01  
JANTX/N98B Zener diode  
M-FS-25249 B79-10462 01  
JANTX/N1202A switching diode  
M-FS-25250 B79-10463 01  
JANTX1N3893 diode  
M-FS-25266 B79-10464 01  
JANTX1N4570A zener diode  
M-FS-25268 B79-10465 01  
JANTX1N5415 diode  
M-FS-25270 B79-10466 01  
JANTX1N5417 diode  
M-FS-25271 B79-10467 01  
JANTX1N5420 diode  
M-FS-25272 B79-10468 01  
JANTX1N5550 switching diode  
M-FS-25273 B79-10469 01  
JANTX1N5552 switching diode  
M-FS-25274 B79-10470 01  
JANTX1N5554 switching diode  
M-FS-25275 B79-10471 01  
JANTX1N5614 switching diode  
M-FS-25276 B79-10472 01  
JANTX1N5615 switching diode  
M-FS-25277 B79-10473 01  
JANTX1N5618 switching diode  
M-FS-25278 B79-10474 01  
JANTX1N5619 diode  
M-FS-25279 B79-10475 01

**DIPLEXERS**  
Components for an S-band communication subsystem  
NPO-13955 B79-10022 02

**DIPOLE ANTENNAS**  
Efficient dichroic plate for microwaves  
GSFC-12171 B79-10002 01

**DISASTERS**  
Monitoring disaster areas via satellites  
LANGLEY-12344 B79-10027 02

**DISCONNECT DEVICES**  
Positive isolation disconnect  
MSC-16043 B79-10410 07

**DISPLACEMENT**  
Accurate determination of work in three-point bend tests  
LEWIS-13034 B79-10236 06  
Angular-displacement mechanism  
M-FS-23777 B79-10408 07

**DISPLACEMENT MEASUREMENT**  
Improved displacement measurement in bend testing  
LEWIS-13035 B79-10237 06

Displacement gage modified for multiple measurements  
LEWIS-13036 B79-10238 06  
Crack-opening displacement transducer  
LANGLEY-12485 B79-10381 06

**DISPLAY DEVICES**  
LED display for solo aircraft instrument navigation  
LANGLEY-12292 B79-10023 02  
Centering images in split-screen TV display  
MSC-18399 B79-10319 02

**DISTORTION**  
Distortion-free foamed-plastic parts  
ARC-11233 B79-10277 08

**DOCUMENT STORAGE**  
A flexible data base  
NPO-13777 B79-10438 09

**DOCUMENTATION**  
An annotated energy bibliography  
LANGLEY-12488 B79-10065 03

**DRIFT (INSTRUMENTATION)**  
Low-noise current regulator  
NPO-14070 B79-10011 01

**DRILLING**  
Plug and drill template  
MSC-16748 B79-10120 07  
Adjusting an electron beam for drilling  
M-FS-19326 B79-10572 08

**DRYING**  
'Self-packaging' desiccant  
NPO-14354 B79-10068 04

**DUCTED FAN ENGINES**  
Fan noise-mode structure in a duct  
LEWIS-13129 B79-10393 06

**DUCTS**  
All-metal muffler for ducts  
ARC-11159 B79-10262 07

**DUST COLLECTORS**  
Production of large-area electrets  
M-FS-23186 B79-10049 03

**DYES**  
Inspecting cracks in foam insulation  
M-FS-23799 B79-10107 06

**DYNAMIC LOADS**  
A closed-loop control-loading system  
LANGLEY-12167 B79-10029 02

**DYNAMIC MODELS**  
Bond graph for modeling valves and switches  
LEWIS-13177 B79-10269 07

**DYNAMIC RESPONSE**  
Fader and ramp shaper replace linear filters  
MSC-16115 B79-10031 02

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**EARTH RESOURCES**  
Remote-sensing applications to geology  
M-FS-25151 B79-10203 03  
AOIPS classification package  
GSFC-12374 B79-10207 03  
Diazo techniques for remote sensor data analysis  
M-FS-25110 B79-10246 06

**EARTH RESOURCES INFORMATION SYSTEM**  
Multipurpose interactive NASA information system  
M-FS-23753 B79-10292 09

**EARTH RESOURCES SURVEY PROGRAM**  
Electronic pictures from charged-coupled devices  
GSFC-12324 B79-10015 02

**EARTH SURFACE**  
Analyzing Earth's surface data  
M-FS-25051 B79-10152 09

**ECHOCARDIOGRAPHY**  
High-resolution echocardiography  
NPO-14349 B79-10081 05

**ECOLOGY**  
Marine chlorophyll a analysis  
LANGLEY-12293 B79-10048 03

**ECONOMIC ANALYSIS**  
Estimating the cost of production stoppage  
M-FS-23884 B79-10149 09

**ECONOMIC FACTORS**  
Solar energy for industrial process heat  
NPO-14498 B79-10064 03

**EDDY CURRENTS**  
Measuring insulation thickness  
M-FS-23798 B79-10108 06

**ELASTIC DEFORMATION**  
Dynamic simulation and stability analysis  
GSFC-12422 B79-10113 06

**ELASTOMERS**  
Stiffness and damping of elastomeric O-rings  
LEWIS-13079 B79-10132 07  
Four-step reaction for polytriazine elastomers  
ARC-11248 B79-10354 04  
Heat- and chemical-resistant oxadiazole elastomers  
ARC-11253 B79-10355 04  
Equilibrium swelling of elastomers in solvents  
NPO-14637 B79-10359 04  
Post-processing flame-retardant for polyurethane  
MSC-16307 B79-10361 04  
Bonding soft rubber or plasticized elastomers to metal  
M-FS-25181 B79-10582 08

**ELECTRETS**  
Production of large-area electrets  
M-FS-23186 B79-10049 03

**ELECTRIC BATTERIES**  
Nuclear electro-optic power  
LANGLEY-12496 B79-10481 03

**ELECTRIC COILS**  
Fixture for winding transformers  
NPO-14146 B79-10423 08

**ELECTRIC CONNECTORS**  
Isolator/retainer for connectors  
MSC-18527 B79-10312 01  
Crimped thermocouple connections  
MSC-18489 B79-10561 08  
Securing connector pins to a PC board  
MSC-16059 B79-10564 08

**ELECTRIC CONTACTS**  
Wraparound-contact solar cells  
LEWIS-13089 B79-10001 01  
Nondestructive pull tester  
MSC-18329 B79-10091 06  
Push test for switch welds  
M-FS-25027 B79-10092 06  
Thermographic inspection of welded contacts  
M-FS-25093 B79-10244 06  
Nondestructive weld test by holography  
M-FS-23826 B79-10245 06  
Stress-relieved solder joints  
MSC-14981 B79-10556 08

**ELECTRIC DISCHARGES**

Cloud-to-ground lightning detector  
KSC-11099 B79-10025 02

**ELECTRIC EQUIPMENT TESTS**

Rapid testing of pulse transformers  
MSC-18202 B79-10529 06

**ELECTRIC GENERATORS**

High-efficiency wind turbine  
M-FS-23830 B79-10483 03

**ELECTRIC MOTORS**

Fast-response power saver for induction motors  
M-FS-23988 B79-10004 01  
Direct-current drive for ac motors  
NPO-14427 B79-10296 01

**ELECTRIC POWER SUPPLIES**

Solar power conditioner  
NPO-14356 B79-10035 03  
Navigation-aid power systems  
NPO-14466 B79-10176 02

**ELECTRIC PROPULSION**

Use of composites in electric vehicles  
NPO-14615 B79-10226 04

**ELECTRIC RELAYS**

Low-EMI solid-state relay  
MSC-12698 B79-10446 01  
Low-cost, lightweight RF transfer switch  
MSC-16907 B79-10453 01

**ELECTRIC WIRE**

Nondestructive pull tester  
MSC-18329 B79-10091 06  
Push test for switch welds  
M-FS-25027 B79-10092 06  
Strain relief for power-cable connectors  
MSC-19497 B79-10310 01  
Wire stripper protects cable shielding  
FRC-10111 B79-10559 08  
Stitch-bond parallel-gap welding for IC circuits  
MSC-16459 B79-10560 08

**ELECTRICAL FAULTS**

Cable-fault locator  
KSC-10899 B79-10024 02

**ELECTRICAL INSULATION**

Measuring resistance or conductance of insulators  
MSC-18132 B79-10096 06  
Measuring insulation thickness  
M-FS-23798 B79-10108 06  
Plastic film insulates solar cells from metal substrate  
M-FS-25007 B79-10145 08

**ELECTRICAL MEASUREMENT**

Obtaining an electrical output from a mechanical flowmeter  
M-FS-23958 B79-10087 06  
Differential oil flowmeter  
M-FS-23959 B79-10088 06  
Electrical indication of airflow rate  
M-FS-23873 B79-10090 06

**ELECTRICAL PROPERTIES**

Reliability of imaging CCD's  
M-FS-25039 B79-10013 01

**ELECTRICAL RESISTANCE**

Measuring resistance or conductance of insulators  
MSC-18132 B79-10096 06

**ELECTRO-OPTICAL PHOTOGRAPHY**

Electronic pictures from charged-coupled devices  
GSFC-12324 B79-10015 02

**ELECTROCARDIOGRAPHY**

Improved capacitive EKG electrode  
MSC-18321 B79-10232 05

**ELECTROCHEMICAL CELLS**

Monitoring harmful gases  
KSC-11086 B79-10211 04  
Platinum electrodes for electrochemical detection of bacteria  
LANGLEY-12462 B79-10228 05

**ELECTRODEPOSITION**

Electrodeposition process reduces cost of cold plates  
MSC-19524 B79-10570 08  
Repairing sealing surfaces on aluminum castings  
M-FS-19455 B79-10573 08

**ELECTRODES**

Measuring resistance or conductance of insulators  
MSC-18132 B79-10096 06  
Audible monitor for electroplating  
M-FS-19333 B79-10106 06  
Giant-electrode welder  
LANGLEY-11429 B79-10136 08  
Platinum electrodes for electrochemical detection of bacteria  
LANGLEY-12462 B79-10228 05  
Improved capacitive EKG electrode  
MSC-18321 B79-10232 05

**ELECTROLYTES**

Increased fuel-cell cross-pressure limit  
M-FS-25196 B79-10484 03

**ELECTROMAGNETIC ABSORPTION**

Mossbauer study of FeSi<sub>2</sub> and FeSe thin films  
M-FS-25088 B79-10371 04

**ELECTROMAGNETIC INTERFERENCE**

Low-EMI solid-state relay  
MSC-12698 B79-10446 01  
Sensor/amplifier for weak light sources  
M-FS-25025 B79-10449 01

**ELECTROMAGNETIC SHIELDING**

Interleaved shielding for cables  
MSC-18369 B79-10311 01  
Wire stripper protects cable shielding  
FRC-10111 B79-10559 08

**ELECTROMAGNETIC WAVE FILTERS**

Efficient dichroic plate for microwaves  
GSFC-12171 B79-10002 01  
Signal separator for dual-frequency antenna  
NPO-14022 B79-10021 02

**ELECTRON BEAM WELDING**

Checking weld penetration  
M-FS-19395 B79-10093 06  
Ultrasonic grating checks electron-beam welds  
M-FS-19422 B79-10094 06  
Viewing electron-beam welds in progress  
M-FS-19364 B79-10580 08  
Welding multiple plies with an electron beam  
M-FS-19428 B79-10581 08

**ELECTRON BEAMS**

Adjusting an electron beam for drilling  
M-FS-19326 B79-10572 08

**ELECTRONIC EQUIPMENT TESTS**

Nondestructive pull tester  
MSC-18329 B79-10091 06  
Push test for switch welds  
M-FS-25027 B79-10092 06  
Detector verifier for circuit analyzers  
MSC-19669 B79-10530 06

**ELECTRONIC FILTERS**

Low-frequency attenuator circuit  
FRC-11012 B79-10010 01  
Components for an S-band communication subsystem  
NPO-13955 B79-10022 02

Fader and ramp shaper replace linear filters  
MSC-16115 B79-10031 02

**ELECTRONIC PACKAGING**

Wraparound-contact solar cells  
LEWIS-13089 B79-10001 01  
Strain relief for power-cable connectors  
MSC-19497 B79-10310 01  
Securing connector pins to a PC board  
MSC-16059 B79-10564 08  
Improved switch-resistor packaging  
MSC-19531 B79-10565 08  
Cost savings in LSI fabrication  
M-FS-25079 B79-10589 08

**ELECTRONIC TRANSDUCERS**

Electrical indication of airflow rate  
M-FS-23873 B79-10090 06

**ELECTROPLATING**

Audible monitor for electroplating  
M-FS-19333 B79-10106 06  
Electroplating offers embrittlement protection  
M-FS-19330 B79-10140 08

**ELECTROSTATIC CHARGE**

Production of large-area electrets  
M-FS-23186 B79-10049 03

**EMBRTTLEMENT**

Electroplating offers embrittlement protection  
M-FS-19330 B79-10140 08

**EMULSIONS**

Soda ash removes sulfur from fuels  
GSFC-12403 B79-10071 04  
Applying photosensitive emulsions to enamel surfaces  
MSC-18107 B79-10144 08

**ENAMELS**

Low absorptance porcelain-on-aluminum coating  
M-FS-23879 B79-10077 04  
Applying photosensitive emulsions to enamel surfaces  
MSC-18107 B79-10144 08

**ENCAPSULATING**

Moisture penetration in microcircuit packages  
M-FS-25087 B79-10315 01

**ENERGY**

An annotated energy bibliography  
LANGLEY-12488 B79-10065 03

**ENERGY ABSORPTION**

Weathering of a liquid-filled solar collector  
M-FS-25113 B79-10059 03  
Fin-tube solar collectors  
M-FS-25238 B79-10344 03  
Collector performance after weathering  
M-FS-25187 B79-10346 03  
Weathering of a flat-plate solar collector  
M-FS-25160 B79-10348 03

**ENERGY CONSERVATION**

Fuel gas from biodigestion  
M-FS-23957 B79-10042 03  
Solar-heating system-performance tests  
M-FS-25116 B79-10054 03  
Performance test for a solar water heater  
M-FS-25114 B79-10055 03  
Analysis of building heating and cooling  
NPO-14683 B79-10067 03  
Irradiation pretreatment for coal desulfurization  
NPO-14104 B79-10069 04

**ENERGY CONVERSION**

Solar power conditioner  
NPO-14356 B79-10035 03

Variable-shape solar-energy concentrator  
NPO-13736 B79-10038 03  
Improved coal-slurry pipeline  
NPO-14425 B79-10041 03  
Static load testing of a liquid solar collector  
M-FS-25115 B79-10057 03  
**ENERGY CONVERSION EFFICIENCY**  
High-efficiency wind turbine  
M-FS-23830 B79-10483 03  
**ENERGY POLICY**  
Solar energy for industrial process heat  
NPO-14498 B79-10064 03  
Model for refining operations  
LEWIS-13047 B79-10293 09  
**ENERGY REQUIREMENTS**  
Solar power conditioner  
NPO-14356 B79-10035 03  
**ENERGY STORAGE**  
Installation package for a solar-heating system  
M-FS-25198 B79-10337 03  
Installation package for a solar-heating system  
M-FS-25157 B79-10340 03  
Wind-energy storage  
LEWIS-13097 B79-10500 03  
**ENERGY TECHNOLOGY**  
Air solar collector-installation package  
M-FS-25031 B79-10056 03  
**ENGINE CONTROL**  
Controller for a string engine  
NPO-14388 B79-10130 07  
**ENGINEERING DRAWINGS**  
Centroids, moments, and radii of gyration  
LEWIS-12765 B79-10117 06  
**ENVIRONMENT MANAGEMENT**  
Analyzing water resources  
M-FS-25104 B79-10235 05  
**ENVIRONMENT POLLUTION**  
LANDSAT and water pollution  
M-FS-25099 B79-10151 09  
**ENVIRONMENTAL TESTS**  
Moisture penetration in microcircuit packages  
M-FS-25087 B79-10315 01  
Test and evaluation of a solar-heating system  
M-FS-25201 B79-10336 03  
**ENVIRONMENTS**  
Burning crude oil without pollution  
NPO-14344 B79-10078 04  
**EQUATIONS OF MOTION**  
Dynamic simulation and stability analysis  
GSFC-12422 B79-10113 06  
Airplane stability programs for pocket calculators  
LANGLEY-12479 B79-10248 06  
**EQUIPMENT SPECIFICATIONS**  
Rankine-cycle solar-cooling systems  
M-FS-25094 B79-10051 03  
Rankine-cycle heating and cooling systems  
M-FS-23998 B79-10052 03  
Design information for solar-heating systems  
M-FS-25097 B79-10053 03  
Design of a concentrating solar collector  
M-FS-25098 B79-10060 03  
Controller for solar heating-design package  
M-FS-25009 B79-10062 03

**ESTIMATES**

Estimating the cost of production stoppage  
M-FS-23884 B79-10149 09

**ETCHING**

Lift-off procedure improves pattern definition  
LANGLEY-12392 B79-10287 08  
Precise wet-chemical etching  
NPO-14339 B79-10364 04

**ETHYLENE OXIDE**

Continuous sterilization of plumbing systems  
KSC-11085 B79-10079 04

**EVACUATING (TRANSPORTATION)**

Monitoring disaster areas via satellites  
LANGLEY-12344 B79-10027 02

**EVACUATING (VACUUM)**

Evacuated-displacement compression molding  
LANGLEY-12523 B79-10584 08

**EVALUATION**

Liquid solar collector-performance evaluation  
M-FS-25090 B79-10058 03

**EXPLOSIVE DEVICES**

Confined explosive joining of tubes  
LANGLEY-12248 B79-10280 08

**EXPOSURE**

Multiple-camera automatic controller  
LEWIS-12711 B79-10175 02

**EXTENSOMETERS**

Noncontact strain measurement  
LEWIS-13091 B79-10243 06

**EYE MOVEMENTS**

Eye-controlled switch  
M-FS-25091 B79-10084 05

**F****FABRICATION**

Assembling solar-cell arrays  
NPO-14416 B79-10037 03  
CMOS circuit-fabrication handbook  
M-FS-25034 B79-10148 08  
Quality control during IC processing  
M-FS-25112 B79-10288 08

**FACSIMILE COMMUNICATION**

Variable-resolution facsimile system  
MSC-18516 B79-10476 02

**FADING**

Fader and ramp shaper replace linear filters  
MSC-16115 B79-10031 02

**FAILURE ANALYSIS**

Design review of a liquid solar collector  
M-FS-25140 B79-10199 03  
Removing overcoatings from microcircuits  
M-FS-23851 B79-10285 08

**FARMLANDS**

Inexpensive land-use maps extracted from satellite data  
M-FS-25111 B79-10150 09

**FASTENERS**

Plug and drill template  
MSC-16748 B79-10120 07  
Removable fastener for insulating tiles  
MSC-16483 B79-10124 07  
Removable fastener for large structures  
M-FS-23990 B79-10127 07  
Fastening hardware to honeycomb panels  
MSC-16752 B79-10142 08

Fastener for easy installation and removal of tiles  
MSC-16892 B79-10276 08  
Torque-wrench extender for hard-to-reach fasteners  
MSC-18488 B79-10404 07

**FATIGUE (MATERIALS)**

Analysis of fatigue damage in composites  
LANGLEY-12431 B79-10220 04  
Fatigue properties of columbium alloy  
MSC-18256 B79-10225 04

**FATIGUE TESTS**

Resonant-fatigue cracking apparatus  
LEWIS-13037 B79-10520 06

**FAULTS**

Cable-fault locator  
KSC-10899 B79-10024 02

**FEEDBACK CIRCUITS**

Low-common-mode differential amplifier  
MSC-18201 B79-10298 01

**FEEDBACK CONTROL**

Higher gain for feedback control subject to vibrations  
LANGLEY-12215 B79-10170 02  
Window comparator for voltages  
FRC-10090 B79-10445 01

**FERRITES**

Mossbauer study of FeSi<sub>2</sub> and FeSe thin films  
M-FS-25088 B79-10371 04

**FETUSES**

Monitoring fetal pH by telemetry  
GSFC-12507 B79-10517 05

**FIBER OPTICS**

Fiber-optic crossbar switch  
KSC-11104 B79-10006 01  
Splicing single-mode optical fibers  
NPO-14626 B79-10282 08  
Fiber-optic proximity sensor  
NPO-14653 B79-10390 06

**FIBERS**

Fibrous refractory composite insulation  
ARC-11169 B79-10224 04

**FIELD EFFECT TRANSISTORS**

Improved process control for VMOS FET's  
GSFC-12515 B79-10563 08

**FILE MAINTENANCE (COMPUTERS)**

A flexible data base  
NPO-13777 B79-10438 09

**FILLETS**

Shear strength of aluminum fillet welds  
M-FS-23946 B79-10511 04

**FILM THICKNESS**

Measuring the thickness of plastic films  
ARC-11219 B79-10098 06  
Vapor-deposited graded-thickness films  
GSFC-11806 B79-10143 08

**FILTERS**

Inductorless tuned circuit for high frequencies  
GSFC-12410 B79-10294 01

**FILTRATION**

Increased fuel-cell cross-pressure limit  
M-FS-25196 B79-10484 03

**FINANCIAL MANAGEMENT**

Estimating the cost of production stoppage  
M-FS-23884 B79-10149 09  
Annuity-estimating program  
ARC-11139 B79-10291 09

**FINISHES**

Applying photosensitive emulsions to enamel surfaces  
MSC-18107 B79-10144 08

**FINITE DIFFERENCE THEORY**

- Transonic flow past swept wings  
 LANGLEY-12446 B79-10542 06  
 Numerical analysis of complex fluid-flow systems  
 M-FS-25125 B79-10591 09

**FINITE ELEMENT METHOD**

- Analysis of fatigue damage in composites  
 LANGLEY-12431 B79-10220 04  
 Nonlinear structural analysis  
 M-FS-25122 B79-10539 06

**FIREPROOFING**

- Water-based intumescent paint  
 MSC-16609 B79-10213 04  
 Flame-resistant textiles  
 MSC-18359 B79-10353 04

**FIXTURES**

- Measuring resistance or conductance of insulators  
 MSC-18132 B79-10096 06  
 Fixture for limited-access welding  
 MSC-16698 B79-10135 08  
 Furnace brazing under partial vacuum  
 M-FS-19363 B79-10137 08  
 Fixture for assembling solar panels  
 NPO-14303 B79-10147 08  
 'Three-dimensional' vibration fixture  
 MSC-16305 B79-10528 06

**FLAME HOLDERS**

- Flat-flame burner  
 LEWIS-13161 B79-10218 04

**FLAME RETARDANTS**

- Synthesis of triaryltrifluoroethanes  
 ARC-11097 B79-10217 04  
 Post-processing flame-retardant for polyurethane  
 MSC-16307 B79-10361 04

**FLAME SPECTROSCOPY**

- Flat-flame burner  
 LEWIS-13161 B79-10218 04

**FLAME SPRAYING**

- High-energy-density cylindrical capacitors  
 LEWIS-12999 B79-10283 08

**FLAMMABILITY**

- Flame-resistant textiles  
 MSC-18359 B79-10353 04  
 Self-curing polyimide foam  
 ARC-11170 B79-10507 04

**FLAMMABLE GASES**

- Estimating effects of accidental propellant explosions  
 LEWIS-13247 B79-10252 06

**FLANGES**

- Signal separator for dual-frequency antenna  
 NPO-14022 B79-10021 02

**FLAT CONDUCTORS**

- Repairing flat cables  
 LANGLEY-11950 B79-10557 08

**FLIGHT CLOTHING**

- Improved temperature-control garment  
 ARC-11239 B79-10227 05

**FLIGHT SIMULATION**

- A closed-loop control-loading system  
 LANGLEY-12167 B79-10029 02  
 Binary-to-Manchester encoders  
 MSC-16546 B79-10157 01

**FLOOD PREDICTIONS**

- Monitoring disaster areas via satellites  
 LANGLEY-12344 B79-10027 02

**FLOODS**

- Analyzing water resources  
 M-FS-25104 B79-10235 05

**FLOW DIRECTION INDICATORS**

- Bidirectional fluid-flow monitor  
 MSC-16762 B79-10089 06

**FLOW DISTRIBUTION**

- Projection optics for a laser velocimeter  
 LANGLEY-12328 B79-10045 03  
 Flow fields in supersonic inlets  
 ARC-11098 B79-10253 06

**FLOW MEASUREMENT**

- Extending the range of leak detectors  
 M-FS-19411 B79-10104 06

**FLOW REGULATORS**

- Controlling a wide range of flow rates  
 NPO-14312 B79-10249 06  
 Bifunctional gas-flow regulator  
 NPO-13135 B79-10266 07  
 Automatic thermal switch  
 GSFC-12415 B79-10400 07  
 Balanced-force flow-regulator valve  
 MSC-12731 B79-10419 07

**FLOW VELOCITY**

- Improved split-film vector anemometer  
 LANGLEY-12391 B79-10240 06

**FLOWMETERS**

- Obtaining an electrical output from a mechanical flowmeter  
 M-FS-23958 B79-10087 06  
 Differential oil flowmeter  
 M-FS-23959 B79-10088 06

**FLUID BOUNDARIES**

- Phase changes in liquid face seals  
 LEWIS-12994 B79-10395 06

**FLUID DYNAMICS**

- Thermodynamic and transport properties of fluids  
 LEWIS-13127 B79-10352 03

**FLUID FILTERS**

- Indirect microbial detection  
 LANGLEY-12520 B79-10515 05

**FLUID FLOW**

- Bidirectional fluid-flow monitor  
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 LANGLEY-12391 B79-10240 06  
 Controlling a wide range of flow rates  
 NPO-14312 B79-10249 06  
 Flow fields in supersonic inlets  
 ARC-11098 B79-10253 06  
 Numerical analysis of complex fluid-flow systems  
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- Synthesis of triaryltrifluoroethanes  
 ARC-11097 B79-10217 04

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- Water-soluble fluorocarbon coating  
 MSC-16562 B79-10212 04

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- Inspecting cracks in foam insulation  
 M-FS-23799 B79-10107 06  
 Temporary insulation with polyurethane foam  
 MSC-18298 B79-10139 08  
 Distortion-free foamed-plastic parts  
 ARC-11233 B79-10277 08  
 Self-curing polyimide foam  
 ARC-11170 B79-10507 04

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- Crimped thermocouple connections  
 MSC-18489 B79-10561 08

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 LANGLEY-11575 B79-10126 07

- Extendable mast  
 LANGLEY-12078 B79-10267 07  
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 LANGLEY-12076 B79-10271 07

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 LANGLEY-12167 B79-10029 02

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- Aircraft mission analysis  
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 NPO-14273 B79-10070 04

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 NPO-14104 B79-10069 04

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- Analysis of fatigue damage in composites  
 LANGLEY-12431 B79-10220 04

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 LEWIS-13090 B79-10386 06

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 GSFC-12171 B79-10002 01

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- Temperature controller for crystal resonators  
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 GSFC-12400 B79-10331 03

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 M-FS-19389 B79-10111 06  
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 MSC-15994 B79-10409 07  
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 NPO-14497 B79-10412 07  
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 LEWIS-13147 B79-10433 08

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 MSC-18322 B79-10101 06

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 LEWIS-12678 B79-10222 04  
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 NPO-14683 B79-10067 03

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M-FS-23826 B79-10245 06

Rotatable microscope stage  
MSC-18549 B79-10332 03

Automatic inspection of silicon wafers  
M-FS-25124 B79-10384 06

**INSTALLING**

Design information for solar-heating systems  
M-FS-25097 B79-10053 03

Design of a concentrating solar collector  
M-FS-25098 B79-10060 03

Cost analysis of hot-air solar-heating systems  
M-FS-25092 B79-10063 03

Precision leveling of large machinery  
NPO-13257 B79-10131 07

**INSTRUMENT PACKAGES**

Antitheft container for instruments  
GSFC-12399 B79-10103 06

An evaluation of low-cost payload carrier  
M-FS-25129 B79-10536 06

**INSULATION**

Design information for solar-heating systems  
M-FS-25097 B79-10053 03

Inspecting cracks in foam insulation  
M-FS-23799 B79-10107 06

Removable fastener for insulating tiles  
MSC-16483 B79-10124 07

Repairing cracked glass  
KSC-11097 B79-10134 08

Temporary insulation with polyurethane foam  
MSC-18298 B79-10139 08

Fibrous refractory composite insulation  
ARC-11169 B79-10224 04

Fastener for easy installation and removal of tiles  
MSC-16892 B79-10276 08

Insulating seal for cryogenic-liquid transfer  
KSC-11105 B79-10415 07

Detecting insulation defects in metal/plastic films  
M-FS-25127 B79-10524 06

**INTEGRATED CIRCUITS**

Remote manipulator for IC wafers  
M-FS-23846 B79-10122 07

CMOS circuit-fabrication handbook  
M-FS-25034 B79-10148 08

Lift-off procedure improves pattern definition  
LANGLEY-12392 B79-10287 08

Quality control during IC processing  
M-FS-25112 B79-10288 08

Automatic inspection of silicon wafers  
M-FS-25124 B79-10384 06

Design rules for CMOS/SOS circuits  
M-FS-25132 B79-10430 08

CMOS/SOS processing  
M-FS-25176 B79-10431 08

Photomask and pattern programs  
NPO-14419 B79-10434 08

Stitch-bond parallel-gap welding for IC circuits  
MSC-16459 B79-10560 08

Multilayer metalization of MOS IC's  
M-FS-23541 B79-10562 08

Improved process control for VMOS FET's  
GSFC-12515 B79-10563 08

**INTEGRATORS**

Improved InSb photodiode preamplifier circuit  
NPO-14418 B79-10007 01

**INTERFACES**

Microprocessor-based interface for oceanography  
NPO-14566 B79-10173 02

Biased-receiver digital interface  
MSC-14968 B79-10448 01

**INTERFEROMETERS**

A chevron beam-splitter interferometer  
NPO-14502 B79-10046 03

**INTERNAL COMBUSTION ENGINES**

Compact reactor for onboard hydrogen generation  
LEWIS-13033 B79-10368 04

Improved piston rings for a stirling engine  
NPO-14497 B79-10412 07

**INVERTED CONVERTERS (DC TO AC)**  
Direct-current drive for ac motors  
NPO-14427 B79-10296 01

**INVERTERS**

Reliable inverter systems  
NPO-14163 B79-10026 02

**INVISCID FLOW**

Transonic airfoil analysis and design  
LANGLEY-12354 B79-10543 06

**ION EXCHANGE MEMBRANE ELECTROLYTES**  
Improved ion-selective membranes  
LEWIS-12678 B79-10222 04

**ION EXCHANGE RESINS**  
Improved microbial-check-valve resins  
MSC-18377 B79-10376 05

**ION EXCHANGING**

Low-cost, high-performance separator for alkaline batteries  
LEWIS-12972 B79-10281 08

**ION IMPLANTATION**

Improved process control for VMOS FET's  
GSFC-12515 B79-10563 08

**ION SOURCES**

A low-cost molecular-leak valve  
LANGLEY-12249 B79-10504 04

**IONIZATION**

An improved welding-arc starter  
MSC-17415 B79-10575 08

**IONIZING RADIATION**

FEP plug protects H2 masers  
GSFC-12552 B79-10494 03

**IRON ALLOYS**

Unresolved Mossbauer hyperfine spectra  
LANGLEY-12439 B79-10513 04

**IRRADIANCE**

Pointing errors in solar dish collectors  
NPO-14630 B79-10181 03

**IRRADIATION**

Irradiation pretreatment for coal desulfurization  
NPO-14104 B79-10069 04

**IRRIGATION**

Analyzing water resources  
M-FS-25104 B79-10235 05

**ISOLATION**

Improved isolation in double-balanced mixers  
NPO-14415 B79-10012 01

**ISOLATORS**

Metallic vibration isolators  
M-FS-23949 B79-10129 07

Isolator/retainer for connectors  
MSC-18527 B79-10312 01

**J****JACKS (LIFTS)**

Thermal jack  
M-FS-19365 B79-10579 08

**JET AIRCRAFT NOISE**

Simple noise suppressor for vented high-pressure gas  
LEWIS-13231 B79-10265 07

Acoustical measurement separates core noise and jet noise  
NPO-14698 B79-10525 06

**JET ENGINE FUELS**

Model for refining operations  
LEWIS-13047 B79-10293 09

**JET ENGINES**

Multiple-camera automatic controller  
LEWIS-12711 B79-10175 02

Measuring acoustic properties of materials and jet nozzles  
LEWIS-13265 B79-10521 06

**JET FLAPS**

Aerodynamic performance of jet-flap wings  
ARC-11215 B79-10541 06

**JIGS**

Fixture for limited-access welding  
MSC-16698 B79-10135 08

Fixture for assembling solar panels  
NPO-14303 B79-10147 08

**JOINTS (JUNCTIONS)**

Hinge-connected rigid bodies  
NPO-11964 B79-10116 06

Confined explosive joining of tubes  
LANGLEY-12248 B79-10280 08

**JOSEPHSON JUNCTIONS**

Proposed Josephson voltage standard  
M-FS-23845 B79-10482 03

## K

## KERNEL FUNCTIONS

Interfering surfaces in subsonic, transonic, and supersonic flow  
 LANGLEY-12524 879-10398 06

## KNUDSEN FLOW

High-pressure mass-spectrometric sampling system  
 LEWIS-12913 879-10219 04

## L

## LABORATORIES

Identification of micro-organisms  
 MSC-18358 879-10085 05

## LABORATORY EQUIPMENT

Quartz ball value  
 NPO-14473 879-10128 07

## LACQUERS

Applying photosensitive emulsions to enamel surfaces  
 MSC-18107 879-10144 08

## LAMINATES

Determining resin/fiber content of laminates  
 LANGLEY-12442 879-10216 04  
 Predicting the wet strength of laminates  
 MSC-18022 879-10242 06  
 High-energy-density flat flexible capacitors  
 LEWIS-13000 879-10284 08  
 Improved flaw-detection method  
 LANGLEY-11866 879-10378 06  
 Detecting insulation defects in metal/plastic films  
 M-FS-25127 879-10524 06  
 Vacuum-and-pressure laminating polymer materials  
 LEWIS-12721 879-10583 08

## LAND USE

Inexpensive land-use maps extracted from satellite data  
 M-FS-25111 879-10150 09

## LANDSAT SATELLITES

Computer analysis of LANDSAT data  
 M-FS-25105 879-10204 03  
 Guide to remote-sensor data systems  
 M-FS-25169 879-10349 03  
 Automatically classifying Earth features from orbit  
 LANGLEY-12589 879-10493 03  
 LANDSAT signature development program  
 KSC-11113 879-10501 03

## LANTHANUM FLUORIDES

Improved insulator layer for MIS devices  
 LANGLEY-12455 879-10302 01

## LARGE SCALE INTEGRATION

Cost savings in LSI fabrication  
 M-FS-25079 879-10589 08

## LASER APPLICATIONS

All-electric gas detector  
 NPO-14341 879-10039 03  
 Low-noise spectrophone  
 NPO-14362 879-10040 03  
 Focusing laser scanner  
 M-FS-25102 879-10184 03  
 Solar-cell defect analyzer  
 NPO-14476 879-10379 06

## LASER DOPPLER VELOCIMETERS

Projection optics for a laser velocimeter  
 LANGLEY-12328 879-10045 03

## LASER OUTPUTS

Lens window simplifies TDL housing  
 LANGLEY-12437 879-10183 03

## LASERS

Optically coupling tunable diode lasers  
 LANGLEY-12438 879-10043 03  
 Projection optics for a laser velocimeter  
 LANGLEY-12328 879-10045 03  
 Laser alignment of large assemblies  
 MSC-19346 879-10097 06  
 Preionized discharge for short-wavelength laser  
 NPO-13945 879-10186 03  
 Transmitter/receiver for laser imaging  
 MSC-18196 879-10325 03  
 Improved degradation resistance of (AlGa)As lasers  
 LANGLEY-12242 879-10486 03  
 Improved vapor-growth technique for III-V compound lasers  
 LANGLEY-12255 879-10487 03  
 Improved thermal-conducting and current-confining film  
 LANGLEY-12350 879-10489 03  
 Ohmic contact to p-type indium phosphide  
 LANGLEY-12351 879-10490 03  
 CdInP semiconductor alloy  
 LANGLEY-12405 879-10491 03

## LATCHES

Antenna deployment mechanism  
 GSFC-12331 879-10121 07  
 Remotely controlled latch  
 MSC-18365 879-10403 07

## LATHES

Low-cost boring mill  
 KSC-11112 879-10268 07

## LEAKAGE

Extending the range of leak detectors  
 M-FS-19411 879-10104 06  
 Zero-leak valve  
 NPO-14717 879-10421 07  
 Protecting brazing furnaces from air leaks  
 M-FS-19379 879-10574 08

## LENSES

Improved flight-simulator viewing lens  
 LANGLEY-12251 879-10044 03  
 Design of a concentrating solar collector  
 M-FS-25098 879-10060 03  
 Lens window simplifies TDL housing  
 LANGLEY-12437 879-10183 03  
 Field-flattener lens  
 MSC-18373 879-10327 03  
 General optics evaluation program  
 GSFC-12439 879-10351 03

## LEVELING

Precision leveling of large machinery  
 NPO-13257 879-10131 07

## LEVITATION

Improved acoustic levitation apparatus  
 M-FS-25050 879-10567 08

## LIGHT (VISIBLE RADIATION)

A chevron beam-splitter interferometer  
 NPO-14502 879-10046 03  
 Preionized discharge for short-wavelength laser  
 NPO-13945 879-10186 03

## LIGHT EMITTING DIODES

LED display for solo aircraft instrument navigation  
 LANGLEY-12292 879-10023 02  
 Simpler cabling and power link for remote readouts  
 GSFC-12411 879-10028 02

## Germanium-on-InP

ure LED  
 LANGLEY-12349 879-10488 03

## LIGHT SOURCES

Sensor/amplifier for weak light sources  
 M-FS-25025 879-10449 01

## LIGHT TRANSMISSION

Fiber-optic crossbar switch  
 KSC-11104 879-10006 01  
 Transparent solar cell module  
 NPO-14304 879-10034 03

## LIGHTING EQUIPMENT

Energy saver for industrial lighting  
 KSC-11103 879-10388 06

## LIGHTNING

Cloud-to-ground lightning detector  
 KSC-11099 879-10025 02  
 Lightning protection for aircraft  
 LEWIS-12981 879-10392 06

## LIMBS (ANATOMY)

Artificial limb connector  
 KSC-11069 879-10083 05

## LIMITER CIRCUITS

Voltage-controlled attenuator with low phase shift  
 NPO-14347 879-10301 01  
 Limiting amplifier for microwaves  
 MSC-18471 879-10314 01

## LINEAR FILTERS

Fader and ramp shaper replace linear filters  
 MSC-16115 879-10031 02

## LINEAR SYSTEMS

Linear continuous and sampled-data systems  
 FRC-10114 879-10440 09

## LININGS

Annular acoustic liners for turbofan engines  
 LEWIS-12810 879-10133 07

## LIQUID OXYGEN

Vacuum-bonded covering withstands low temperatures  
 MSC-16235 879-10509 04

## LIQUID ROCKET PROPELLANTS

Estimating effects of accidental propellant explosions  
 LEWIS-13247 879-10252 06

## LIQUID-GAS MIXTURES

Silicon tetrachloride spray feeder  
 NPO-14382 879-10073 04  
 Separating liquid and gaseous solutions  
 M-FS-23368 879-10506 04

## LIQUID-LIQUID INTERFACES

Liquid/liquid heat exchanger  
 NPO-14271 879-10329 03

## LIQUID-VAPOR EQUILIBRIUM

Simple estimate of critical volume  
 NPO-14464 879-10358 04

## LIQUID-VAPOR INTERFACES

Phase changes in liquid face seals  
 LEWIS-12994 879-10395 06

## LIQUIDS

Liquid solar collector-performance evaluation  
 M-FS-25090 879-10058 03

## LOAD TESTS

Static load testing of a liquid solar collector  
 M-FS-25115 879-10057 03

## LOADING MOMENTS

Accurate determination of work in three-point bend tests  
 LEWIS-13034 879-10236 06

**LOADS (FORCES)**

Redundant structures at elevated temperatures  
MSC-18476 B79-10540 06

**LOCKS (FASTENERS)**

Antitheft container for instruments  
GSFC-12399 B79-10103 06

**LOGIC CIRCUITS**

A telephone multiline signaling system  
KSC-11023 B79-10030 02  
Offset compensation for A/D converters  
NPO-13438 B79-10163 01  
Development of CMOS integrated circuits  
M-FS-25121 B79-10165 01  
Real-time digital integrator  
NPO-14530 B79-10447 01  
Biased-receiver digital interface  
MSC-14968 B79-10448 01  
Conserving power in computer memories  
LANGLEY-11952 B79-10477 02

**LONGITUDINAL STABILITY**

Characteristics of wing/body/tail configurations  
ARC-11224 B79-10254 06

**LOUDNESS**

Overall loudness of steady sounds  
LEWIS-12914 B79-10538 06

**LOW FREQUENCIES**

Low-frequency attenuator circuit  
FRC-11012 B79-10010 01

**LOW GRAVITY MANUFACTURING**

Separating liquid and gaseous solutions  
M-FS-23368 B79-10506 04

**LOW PASS FILTERS**

Fader and ramp shaper replace linear filters  
MSC-16115 B79-10031 02  
Computation-saving digital filter  
MSC-18057 B79-10154 01  
CMOS analog switches for adaptive filters  
NPO-14442 B79-10307 01

**LUBRICANTS**

RF-sputtered and ion-plated solid lubricants  
LEWIS-13147 B79-10433 08

**M****MACHINE TOOLS**

Lash-free spherical bearing  
M-FS-23447 B79-10259 07  
Low-cost boring mill  
KSC-11112 B79-10268 07

**MACHINING**

Adjusting an electron beam for drilling  
M-FS-19326 B79-10572 08

**MAGNETIC TRANSDUCERS**

Slip sensor  
NPO-14655 B79-10405 07  
High-temperature high-pressure magnetic pickup  
MSC-18389 B79-10532 06

**MAINTENANCE**

Cost analysis of hot-air solar-heating systems  
M-FS-25092 B79-10063 03  
Troubleshooting plated-wire memories  
M-FS-23903 B79-10099 06  
Repairing cracked glass  
KSC-11097 B79-10134 08

Repairing ceramic insulating tiles  
MSC-18368 B79-10426 08  
Repairing flat cables  
LANGLEY-11950 B79-10557 08

**MANAGEMENT SYSTEMS**

A flexible data base  
NPO-13777 B79-10438 09

**MANDRELS**

Volume-change indicator for molding plastic  
LANGLEY-12280 B79-10123 07

**MANIPULATORS**

Remote manipulator for IC wafers  
M-FS-23846 B79-10122 07  
Slip sensor  
NPO-14655 B79-10405 07  
Coupler for remote manipulators  
GSFC-12429 B79-10406 07

**MAPPING**

Analyzing Earth's surface data  
M-FS-25051 B79-10152 09  
Microprocessor-based interface for oceanography  
NPO-14566 B79-10173 02

**MAPS**

Inexpensive land-use maps extracted from satellite data  
M-FS-25111 B79-10150 09

**MARINE ENVIRONMENTS**

Marine chlorophyll a analysis  
LANGLEY-12293 B79-10048 03

**MARKING**

Precision scribe  
LEWIS-12976 B79-10566 08

**MARKOV PROCESSES**

Redundant system reliability analysis  
LANGLEY-12069 B79-10153 09

**MASERS**

improving maser frequency stability  
GSFC-12400 B79-10331 03

**MASKING**

Temporary insulation with polyurethane foam  
MSC-18298 B79-10139 08

**MASS**

Accurate measurements of mass and center of mass  
NPO-14428 B79-10095 06

**MASS SPECTROMETERS**

Extending the range of leak detectors  
M-FS-19411 B79-10104 06  
Multiplexed mass spectrometer for desorption studies  
ARC-11134 B79-10185 03  
Improved time-of-flight mass spectrometer  
ARC-11090 B79-10187 03  
High-pressure mass-spectrometric sampling system  
LEWIS-12913 B79-10219 04  
A low-cost molecular-leak valve  
LANGLEY-12249 B79-10504 04

**MATERIALS HANDLING**

Coupler for remote manipulators  
GSFC-12429 B79-10406 07  
Fabrication of a pillowed airbag  
MSC-18455 B79-10424 08  
Helicopter sling loads  
LANGLEY-12557 B79-10544 06

**MATHEMATICAL MODELS**

Solar insulation model  
NPO-14787 B79-10350 03

**MAXIMUM LIKELIHOOD ESTIMATES**

Maximum-likelihood data decoder  
NPO-13574 B79-10172 02

**MEASUREMENT**

Measuring signal-to-noise ratio automatically  
NPO-14582 B79-10297 01

**MEASURING INSTRUMENTS**

Electrical indication of airflow rate  
M-FS-23873 B79-10090 06  
Accurate measurements of mass and center of mass  
NPO-14428 B79-10095 06  
Measuring moisture in the atmosphere  
M-FS-25032 B79-10110 06  
Displacement gage modified for multiple measurements  
LEWIS-13036 B79-10238 06

**MECHANICAL DEVICES**

Parachute deploy/Release mechanism  
LANGLEY-11575 B79-10126 07

**MECHANICAL DRIVES**

Film-advance monitor  
LANGLEY-12474 B79-10119 07  
Antenna deployment mechanism  
GSFC-12331 B79-10121 07  
Compact rotary sequencer  
MSC-19514 B79-10401 07

**MEDICAL ELECTRONICS**

Low-frequency attenuator circuit  
FRC-11012 B79-10010 01

**MEDICAL EQUIPMENT**

Artificial limb connector  
KSC-11069 B79-10083 05

**MEMBRANES**

Improved ion-selective membranes  
LEWIS-12678 B79-10222 04

**MESH**

Metallic vibration isolators  
M-FS-23949 B79-10129 07

**METAL BONDING**

Furnace brazing under partial vacuum  
M-FS-19363 B79-10137 08  
Room-temperature bonding of thin plastic sheets  
NPO-14346 B79-10138 08  
Bonding soft rubber or plasticized elastomers to metal  
M-FS-25181 B79-10582 08  
Electromagnetic bonding of plastics to aluminum  
M-FS-25083 B79-10585 08  
**METAL COATINGS**  
Room-temperature bonding of thin plastic sheets  
NPO-14346 B79-10138 08  
A plasma-sprayed valve coating  
M-FS-19494 B79-10568 08

**METAL FATIGUE**

Stress corrosion in high-strength aluminum alloys  
M-FS-23986 B79-10372 04

**METAL FILMS**

Controlled metal-film deposition on alumina substrates  
ARC-11214 B79-10080 04  
Peel testing metalized films  
NPO-14672 B79-10382 06  
Improved thermal-conducting and current-confining film  
LANGLEY-12350 B79-10489 03

**METAL JOINTS**

Push test for switch welds  
M-FS-25027 B79-10092 06

**METAL MATRIX COMPOSITES**

Composites of immiscible metals  
M-FS-23816 B79-10508 04

**METAL OXIDE SEMICONDUCTORS**

CMOS circuit-fabrication handbook  
M-FS-25034 B79-10148 08

- Development of CMOS integrated circuits  
M-FS-25121 B79-10165 01  
CMOS analog switches for adaptive filters  
NPO-14442 B79-10307 01  
Measuring charge nonuniformity in MOS devices  
NPO-14585 B79-10308 01  
Design rules for CMOS/SOS circuits  
M-FS-25132 B79-10430 08  
CMOS/SOS processing  
M-FS-25176 B79-10431 08  
Multilayer metalization of MOS IC's  
M-FS-23541 B79-10562 08  
Improved process control for VMOS FET's  
GSFC-12515 B79-10563 08
- METAL OXIDES**  
Controlled metal-film deposition on alumina substrates  
ARC-11214 B79-10080 04
- METAL POWDER**  
Strength enhancement of prealloyed powder superalloys  
LEWIS-13173 B79-10221 04
- METAL SHEETS**  
All-metal muffler for ducts  
ARC-11159 B79-10262 07  
Safe bending of boron/aluminum sheets  
MSC-19525 B79-10428 08  
Welding multiple plies with an electron beam  
M-FS-19428 B79-10581 08
- METAL WORKING**  
Low-cost boring mill  
KSC-11112 B79-10268 07
- METAL-METAL BONDING**  
Removing bonded skin from a substrate  
MSC-19664 B79-10587 08
- METALLIZING**  
Multilayer metalization of MOS IC's  
M-FS-23541 B79-10562 08
- METALS**  
Metallic vibration isolators  
M-FS-23949 B79-10129 07
- METEOROLOGICAL INSTRUMENTS**  
Measuring moisture in the atmosphere  
M-FS-25032 B79-10110 06  
Microwave measurement of atmospheric pressure  
NPO-14450 B79-10333 03
- METEOROLOGICAL SATELLITES**  
Meteorological data-processing package  
GSFC-12372 B79-10206 03
- METHANE**  
Fuel gas from biodigestion  
M-FS-23957 B79-10042 03
- METHYL COMPOUNDS**  
Synthesis of 2, 4, 8, 10-tetroxaspiro (5.5) undecane  
ARC-11243 B79-10356 04
- MICROBIOLOGY**  
Identification of micro-organisms  
MSC-18358 B79-10085 05
- MICROELECTRONICS**  
Removing overcoatings from microcircuits  
M-FS-23851 B79-10285 08  
Moisture penetration in microcircuit packages  
M-FS-25087 B79-10315 01  
Cost savings in LSI fabrication  
M-FS-25079 B79-10589 08
- MICROMETERS**  
Determining radii of cylindrical segments  
LEWIS-12826 B79-10537 06
- MICROMINIATURIZATION**  
CMOS circuit-fabrication handbook  
M-FS-25034 B79-10148 08
- MICROORGANISMS**  
Identification of micro-organisms  
MSC-18358 B79-10085 05  
Cinemicrographic specimen housing  
LANGLEY-12047 B79-10231 05  
Improved microbial-check-valve resins  
MSC-18377 B79-10376 05  
Indirect microbial detection  
LANGLEY-12520 B79-10515 05
- MICROPROCESSORS**  
Microprocessor-controlled receiver  
ARC-11275 B79-10318 02
- MICROSCOPES**  
Rotatable microscope stage  
MSC-18549 B79-10332 03  
Microscope for high-temperature welding  
MSC-19572 B79-10576 08
- MICROSCOPY**  
Cinemicrographic specimen housing  
LANGLEY-12047 B79-10231 05
- MICROWAVE AMPLIFIERS**  
FEP plug protects H2 masers  
GSFC-12552 B79-10494 03
- MICROWAVE ANTENNAS**  
Low-backlobe microwave transmitting horn  
NPO-14077 B79-10003 01  
Analysis of aperture antenna radiation pattern  
MSC-16246 B79-10066 03  
Dual hybrid mode feed horn  
NPO-13594 B79-10168 02
- MICROWAVE CIRCUITS**  
Stress-relieved solder joints  
MSC-14981 B79-10556 08
- MICROWAVE EQUIPMENT**  
Group-delay standards  
NPO-13938 B79-10014 01  
Measuring the permittivity of gases and aerosols  
KSC-11090 B79-10239 06
- MICROWAVE FREQUENCIES**  
Limited scan dual-band high-gain antenna  
NPO-14038 B79-10167 02
- MICROWAVE SCATTERING**  
Microwave measurement of atmospheric pressure  
NPO-14450 B79-10333 03
- MICROWAVE SWITCHING**  
Components for an S-band communication subsystem  
NPO-13955 B79-10022 02
- MICROWAVES**  
Efficient dichroic plate for microwaves  
GSFC-12171 B79-10002 01  
Signal separator for dual-frequency antenna  
NPO-14022 B79-10021 02
- MILK**  
Solar energy for industrial process heat  
NPO-14498 B79-10064 03
- MILLING MACHINES**  
Low-cost boring mill  
KSC-11112 B79-10268 07
- MINICOMPUTERS**  
Minicomputer version of SPAR  
LANGLEY-12370 B79-10115 06
- MINING**  
Ensuring flat cuts in longwall mining  
M-FS-23726 B79-10118 07  
Measuring coal thickness  
M-FS-23979 B79-10363 04
- MIRRORS**  
Transmitter/receiver for laser imaging  
MSC-18196 B79-10325 03  
General optics evaluation program  
GSFC-12439 B79-10351 03
- MIS (SEMICONDUCTORS)**  
Improved insulator layer for MIS devices  
LANGLEY-12455 B79-10302 01
- MISSION PLANNING**  
Aircraft mission analysis  
LANGLEY-12299 B79-10112 06  
Goddard trajectory determination  
GSFC-11946 B79-10114 06
- MISSIONS**  
Aircraft mission analysis  
LANGLEY-12299 B79-10112 06
- MITOSIS**  
Indirect microbial detection  
LANGLEY-12520 B79-10515 05
- MIXING CIRCUITS**  
Improved isolation in double-balanced mixers  
NPO-14415 B79-10012 01
- MODE TRANSFORMERS**  
Dual hybrid mode feed horn  
NPO-13594 B79-10168 02
- MODEMS**  
Teletype test unit  
LANGLEY-12527 B79-10166 02
- MODULATORS**  
Improved ripple rejection in a PWM  
MSC-16923 B79-10164 01  
All-digital QPSK modulator  
MSC-16922 B79-10320 02  
Digital generation of command-encoder waveforms  
GSFC-12203 B79-10478 02
- MOISTURE CONTENT**  
Predicting the wet strength of laminates  
MSC-18022 B79-10242 06
- MOISTURE METERS**  
Measuring moisture in the atmosphere  
M-FS-25032 B79-10110 06  
Moisture penetration in microcircuit packages  
M-FS-25087 B79-10315 01
- MOLDING MATERIALS**  
Distortion-free foamed-plastic parts  
ARC-11233 B79-10277 08
- MOLDS**  
Volume-change indicator for molding plastic  
LANGLEY-12280 B79-10123 07  
Distortion-free foamed-plastic parts  
ARC-11233 B79-10277 08  
Evacuated-displacement compression molding  
LANGLEY-12523 B79-10584 08
- MOLECULAR FLOW**  
A low-cost molecular-leak value  
LANGLEY-12249 B79-10504 04
- MOLECULAR SPECTRA**  
High-pressure mass-spectrometric sampling system  
LEWIS-12913 B79-10219 04
- MOLECULAR STRUCTURE**  
Simple estimate of critical volume  
NPO-14464 B79-10358 04

## MOMENTS OF INERTIA

- Centroids, moments, and radii of gyration  
LEWIS-12765 B79-10117 06  
Mass properties of a rigid structure  
LANGLEY-12454 B79-10441 09

## MONITORS

- Bidirectional fluid-flow monitor  
MSC-16762 B79-10089 06  
Audible monitor for electroplating  
M-FS-19333 B79-10106 06  
Film-advance monitor  
LANGLEY-12474 B79-10119 07  
Monitoring harmful gases  
KSC-11086 B79-10211 04

## MONOMERS

- Improved synthesis of polyformals  
ARC-11244 B79-10505 04

## MONTE CARLO METHOD

- Monte Carlo variance reduction  
M-FS-23645 B79-10499 03

## MOSSBAUER EFFECT

- Mossbauer study of FeSi<sub>2</sub> and FeSe thin films  
M-FS-25088 B79-10371 04  
Unresolved Mossbauer hyperfine spectra  
LANGLEY-12439 B79-10513 04

## MOTORS

- Fast-response power saver for induction motors  
M-FS-23988 B79-10004 01

## MOUNTING

- Technique for mounting pyroelectric detector arrays  
LANGLEY-12363 B79-10425 08  
Adjustable holder for transducer mounting  
MSC-18371 B79-10535 06

## MUFFLERS

- All-metal muffler for ducts  
ARC-11159 B79-10262 07

## MULTIPLEXING

- Simpler cabling and power link for remote readouts  
GSFC-12411 B79-10028 02  
Optical memories in digital computing  
M-FS-23897 B79-10032 02  
Multiplexed mass spectrometer for desorption studies  
ARC-11134 B79-10185 03

## MULTIPLIERS

- VHF frequency multiplier  
NPO-13700 B79-10005 01

## MULTISPECTRAL BAND SCANNERS

- Optical system for multispectral scanner  
MSC-18255 B79-10047 03

## MULTISPECTRAL PHOTOGRAPHY

- Marine chlorophyll a analysis  
LANGLEY-12293 B79-10048 03  
AOIPS classification package  
GSFC-12374 B79-10207 03  
LANDSAT signature development program  
KSC-11113 B79-10501 03

## MULTIVIBRATORS

- Improved ripple rejection in a PWM  
MSC-16923 B79-10164 01

## MYOCARDIUM

- Trifunctional transducer for myocardial monitoring  
NPO-14329 B79-10518 05

## N

## NAVIGATION

- SKYMAP star catalog  
GSFC-12445 B79-10205 03

## NAVIGATION AIDS

- Navigation-aid power systems  
NPO-14466 B79-10176 02

## NAVIGATION INSTRUMENTS

- LED display for solo aircraft instrument navigation  
LANGLEY-12292 B79-10023 02

## NEUTRON ACTIVATION ANALYSIS

- Low-dose total-body-calcium analysis  
MSC-18282 B79-10233 05

## NEWTON-RAPHSON METHOD

- Nonlinear structural analysis  
M-FS-25122 B79-10539 06

## NEWTONIAN FLUIDS

- Relating viscosity to polymer concentration  
NPO-14609 B79-10357 04  
Equilibrium swelling of elastomers in solvents  
NPO-14637 B79-10359 04

## NICKEL ALLOYS

- Electroplating offers embrittlement protection  
M-FS-19330 B79-10140 08  
Strength enhancement of prealloyed powder superalloys  
LEWIS-13173 B79-10221 04  
Engineering properties of Incoloy-903 and CTX-1  
M-FS-23359 B79-10512 04

## NICKEL PLATE

- Electrodeposition process reduces cost of cold plates  
MSC-19524 B79-10570 08  
Repairing sealing surfaces on aluminum castings  
M-FS-19455 B79-10573 08  
Brazing titanium to stainless steel  
LANGLEY-11441 B79-10577 08

## NIOBIUM

- Fatigue properties of columbium alloy  
MSC-18256 B79-10225 04

## NITROGEN DIOXIDE

- Monitoring harmful gases  
KSC-11086 B79-10211 04

## NITROUS OXIDES

- Remote measurement of atmospheric pollutants  
LANGLEY-12277 B79-10210 04

## NODES (STANDING WAVES)

- Improved acoustic levitation apparatus  
M-FS-25050 B79-10567 08

## NOISE MEASUREMENT

- Acoustical measurement separates core noise and jet noise  
NPO-14698 B79-10525 06

## NOISE REDUCTION

- Low-frequency attenuator circuit  
FRC-11012 B79-10010 01  
Improving low-illumination video  
MSC-14841 B79-10016 02  
Annular acoustic liners for turbofan engines  
LEWIS-12810 B79-10133 07  
All-metal muffler for ducts  
ARC-11159 B79-10262 07  
Simple noise suppressor for vented high-pressure gas  
LEWIS-13231 B79-10265 07

- Low-common-mode differential amplifier  
MSC-18201 B79-10298 01

## NOISE SPECTRA

- Self-calibrating threshold detector for noisy signals  
MSC-16370 B79-10009 01

## NOISE THRESHOLD

- Overall loudness of steady sounds  
LEWIS-12914 B79-10538 06

## NONDESTRUCTIVE TESTS

- Measuring the thickness of plastic films  
ARC-11219 B79-10098 06  
Reliability of nondestructive evaluation data  
LEWIS-12908 B79-10257 06  
Solar-cell defect analyzer  
NPO-14476 B79-10379 06  
Triple-exposure holography for materials tests  
M-FS-25180 B79-10519 06

## NUCLEAR ELECTRIC POWER GENERATION

- Nuclear electro-optic power  
LANGLEY-12496 B79-10481 03

## NUCLEAR REACTORS

- Degassing procedure for ultrahigh vacuum  
M-FS-25103 B79-10188 03

## NUMERICAL ANALYSIS

- Numerical analysis of complex fluid-flow systems  
M-FS-25125 B79-10591 09

## NUMERICAL CONTROL

- Dynamic-pressure regulator  
MSC-18415 B79-10418 07  
Programmable solar-energy controller  
M-FS-25189 B79-10495 03

## NUTS (FASTENERS)

- Fastening hardware to honeycomb panels  
MSC-16752 B79-10142 08  
Retainers for threaded parts  
MSC-16198 B79-10264 07  
Extra-strong 'floating nut'  
MSC-16938 B79-10270 07

## O

## O RING SEALS

- Rubber valve seal with tough skin  
LANGLEY-11776 B79-10125 07  
Stiffness and damping of elastomeric O-rings  
LEWIS-13079 B79-10132 07  
Window with integral seal  
MSC-16490 B79-10141 08  
Multipurpose seals for pressure vessels  
LEWIS-12944 B79-10263 07

## OCEAN DATA ACQUISITIONS SYSTEMS

- Microwave measurement of atmospheric pressure  
NPO-14450 B79-10333 03

## OCEANOGRAPHY

- Microprocessor-based interface for oceanography  
NPO-14566 B79-10173 02

## OFF-ON CONTROL

- Analog actuator-piston memory  
MSC-12697 B79-10317 02

## OIL EXPLORATION

- Controlling a wide range of flow rates  
NPO-14312 B79-10249 06

**OIL RECOVERY**

- Double-wall tubing for oil recovery  
NPO-14606 B79-10360 04  
Water-cooled insulated steam-injection wells  
NPO-14605 B79-10369 04

**OILS**

- Burning crude oil without pollution  
NPO-14344 B79-10078 04

**OPERATIONAL AMPLIFIERS**

- Low-noise current regulator  
NPO-14070 B79-10011 01

**OPTICAL COMMUNICATION**

- Fiber-optic crossbar switch  
KSC-11104 B79-10006 01

**OPTICAL COUPLING**

- Optically coupling tunable diode lasers  
LANGLEY-12438 B79-10043 03

**OPTICAL DATA PROCESSING**

- Variable-resolution facsimile system  
MSC-18516 B79-10476 02  
Optical comparator uses holographic subtraction  
LANGLEY-12126 B79-10590 09

**OPTICAL DENSITY**

- Microcomputer helps evaluate skin burns  
NPO-14402 B79-10082 05

**OPTICAL EQUIPMENT**

- Improved flight-simulator viewing lens  
LANGLEY-12251 B79-10044 03  
Fabricating wedge-shaped beam splitters  
GSFC-12348 B79-10326 03  
Improved optics for an ultracentrifuge  
NPO-13657 B79-10375 05

**OPTICAL FILTERS**

- Microscope for high-temperature welding  
MSC-19572 B79-10576 08  
Viewing electron-beam welds in progress  
M-FS-19364 B79-10580 08

**OPTICAL MEASURING INSTRUMENTS**

- A chevron beam-splitter interferometer  
NPO-14502 B79-10046 03  
Eye-controlled switch  
M-FS-25091 B79-10084 05  
Measuring the thickness of plastic films  
ARC-11219 B79-10098 06  
Fiber-optic proximity sensor  
NPO-14653 B79-10390 06

**OPTICAL MEMORY (DATA STORAGE)**

- Optical memories in digital computing  
M-FS-23897 B79-10032 02

**OPTICAL PATHS**

- Splicing single-mode optical fibers  
NPO-14626 B79-10282 08

**OPTICAL PROPERTIES**

- Transparent solar cell module  
NPO-14304 B79-10034 03

**OPTICAL REFLECTION**

- Determination of total surface reflectivity  
M-FS-25024 B79-10100 06

**OPTICAL SCANNERS**

- Optical system for multispectral scanner  
MSC-18255 B79-10047 03  
Focusing laser scanner  
M-FS-25102 B79-10184 03  
Transmitter/receiver for laser imaging  
MSC-18196 B79-10325 03  
Field-flattener lens  
MSC-18373 B79-10327 03

**OPTIMIZATION**

- The design of solar-heating systems  
M-FS-25108 B79-10191 03

**ORBITAL MECHANICS**

- Goddard trajectory determination  
GSFC-11946 B79-10114 06

**ORIENTATION**

- Sun tracker for clear or cloudy weather  
M-FS-23999 B79-10036 03

**OSCILLATORS**

- Inductorless tuned circuit for high frequencies  
GSFC-12410 B79-10294 01

**OUTGASSING**

- Vacuum-and-pressure laminating polymer materials  
LEWIS-12721 B79-10583 08

**OVERVOLTAGE**

- Surge protection with automatic reset  
MSC-18356 B79-10305 01

**OXIDATION RESISTANCE**

- A thermocouple for hot, oxidizing environments  
LANGLEY-12229 B79-10247 06  
Single-, two-, and three-phase binary-alloy systems  
LANGLEY-12381 B79-10514 04  
Inhibiting oxidation of tungsten at high temperatures  
M-FS-19347 B79-10569 08

**OXIDE FILMS**

- Reliability of imaging CCD's  
M-FS-25039 B79-10013 01  
Improved insulator layer for MIS devices  
LANGLEY-12455 B79-10302 01

**OXYGEN**

- Detecting oxygen in hydrogen or hydrogen in oxygen  
MSC-18380 B79-10365 04

**OZONE**

- Remote measurement of atmospheric pollutants  
LANGLEY-12277 B79-10210 04

**OZONIDES**

- Thermoluminescence analysis of aerosols  
LANGLEY-12046 B79-10208 04

**P****PACKAGING**

- An evaluation of low-cost payload carrier  
M-FS-25129 B79-10536 06  
Stitch-bond parallel-gap welding for IC circuits  
MSC-16459 B79-10560 08  
Improved switch-resistor packaging  
MSC-19531 B79-10565 08

**PAINTS**

- Water-based intumescent paint  
MSC-16609 B79-10213 04  
Recirculating sprayer for fiber-filled paints  
KSC-11146 B79-10552 07

**PANEL FLUTTER**

- Advanced-panel pilot code  
ARC-11278 B79-10255 06

**PANELS**

- Fixture for assembling solar panels  
NPO-14303 B79-10147 08  
Testing panels in shear and biaxial compression  
MSC-16132 B79-10241 06

**PARACHUTES**

- Parachute deploy/Release mechanism  
LANGLEY-11575 B79-10126 07

**PARTICLE ACCELERATORS**

- Degassing procedure for ultrahigh vacuum  
M-FS-25103 B79-10188 03

**PARTICLE SIZE DISTRIBUTION**

- Instrument for aerosol characterization  
NPO-14320 B79-10209 04

**PATTERN RECOGNITION**

- Real-time video-image analysis  
NPO-14282 B79-10018 02  
Image-analysis library  
MSC-18178 B79-10442 09

**PAYLOADS**

- An evaluation of low-cost payload carrier  
M-FS-25129 B79-10536 06

**PEELING**

- Peel testing metalized films  
NPO-14672 B79-10382 06  
Removing bonded skin from a substrate  
MSC-19664 B79-10587 08

**PERFORMANCE PREDICTION**

- Minicomputer version of SPAR  
LANGLEY-12370 B79-10115 06

**PERFORMANCE TESTS**

- Solar-heating system-performance tests  
M-FS-25116 B79-10054 03  
Liquid solar collector-performance evaluation  
M-FS-25090 B79-10058 03  
Concentrating solar collector-performance tests  
M-FS-25086 B79-10061 03  
Design review of a liquid solar collector  
M-FS-25140 B79-10199 03  
Verification tests for a solar-heating system  
M-FS-25178 B79-10338 03  
Certification of the concentrating solar collector  
M-FS-25220 B79-10345 03  
Testing of a solar collector with concentrating mirrors  
M-FS-25310 B79-10497 03

**PERMITTIVITY**

- Measuring the permittivity of gases and aerosols  
KSC-11090 B79-10239 06

**PETN**

- Synthesis of 2, 4, 8, 10-tetroxaspiro (5.5) undecane  
ARC-11243 B79-10356 04

**PH**

- Monitoring fetal pH by telemetry  
GSFC-12507 B79-10517 05

**PHASE CONTROL**

- Fast-response power saver for induction motors  
M-FS-23988 B79-10004 01  
Limiting amplifier for microwaves  
MSC-18471 B79-10314 01

**PHASE LOCKED SYSTEMS**

- Lock detector for noise-coded signals  
NPO-14435 B79-10324 02

**PHASE SHIFT**

- Group-delay standards  
NPO-13938 B79-10014 01  
Voltage-controlled attenuator with low phase shift  
NPO-14347 B79-10301 01

**PHASE SHIFT CIRCUITS**

- Digital phase shifter  
LANGLEY-12338 B79-10159 01



**PHASE SHIFT KEYING**

- Decision-directed automatic gain control
  - NPO-13639 B79-10008 01
  - Improved isolation in double-balanced mixers
    - NPO-14415 B79-10012 01
    - Stable S-band power amplifier
      - NPO-14443 B79-10313 01
      - All-digital QPSK modulator
        - MSC-16922 B79-10320 02

**PHASED ARRAYS**

- Limited scan dual-band high-gain antenna
  - NPO-14038 B79-10167 02
  - Wide-beam flush-mounted antenna
    - MSC-16800 B79-10169 02

**PHOSPHORS**

- Nuclear electro-optic power
  - LANGLEY-12496 B79-10481 03

**PHOSPHORYLATION**

- Improved synthesis of polyformals
  - ARC-11244 B79-10505 04

**PHOTOCONDUCTORS**

- Lift-off procedure improves pattern definition
  - LANGLEY-12392 B79-10287 08

**PHOTODIODES**

- Improved InSb photodiode preamplifier circuit
  - NPO-14418 B79-10007 01

**PHOTOELECTRIC CELLS**

- Theory of back-surface-field solar cells
  - NPO-14451 B79-10050 03
  - Photocapacitive infrared detector and solar cell
    - LANGLEY-12345 B79-10162 01

**PHOTOGRAPHIC EMULSIONS**

- Applying photosensitive emulsions to enamel surfaces
  - MSC-18107 B79-10144 08

**PHOTOGRAPHIC EQUIPMENT**

- Film-advance monitor
  - LANGLEY-12474 B79-10119 07
  - Multiple-camera automatic controller
    - LEWIS-12711 B79-10175 02

**PHOTOGRAPHIC PROCESSING**

- Diazo techniques for remote sensor data analysis
  - M-FS-25110 B79-10246 06

**PHOTOINTERPRETATION**

- Computer analysis of LANDSAT data
  - M-FS-25105 B79-10204 03

**PHOTOMICROGRAPHY**

- Cinemicrographic specimen housing
  - LANGLEY-12047 B79-10231 05

**PHOTOSENSITIVITY**

- Applying photosensitive emulsions to enamel surfaces
  - MSC-18107 B79-10144 08
  - Lift-off procedure improves pattern definition
    - LANGLEY-12392 B79-10287 08

**PHOTOVOLTAIC CELLS**

- Assembling solar-cell arrays
  - NPO-14416 B79-10037 03

**PHYSIOLOGICAL FACTORS**

- Anthropometric sourcebook
  - MSC-18500 B79-10234 05

**PILOT TRAINING**

- Improved flight-simulator viewing lens
  - LANGLEY-12251 B79-10044 03

**PINS**

- Securing connector pins to a PC board
  - MSC-16059 B79-10564 08

**PIPELINES**

- Improved coal-slurry pipeline
  - NPO-14425 B79-10041 03
  - Double-wall tubing for oil recovery
    - NPO-14606 B79-10360 04
    - Water-cooled insulated steam-injection wells
      - NPO-14605 B79-10369 04
      - Vacuum-bonded covering withstands low temperatures
        - MSC-16235 B79-10509 04

**PIPES (TUBES)**

- Furnace brazing under partial vacuum
  - M-FS-19363 B79-10137 08
  - Confined explosive joining of tubes
    - LANGLEY-12248 B79-10280 08
    - Strong, corrosion-resistant aluminum tubing
      - MSC-18040 B79-10417 07
      - Tube-shape verifier
        - MSC-19623 B79-10571 08

**PISTONS**

- Retainers for threaded parts
  - MSC-16198 B79-10264 07
  - Centrifugal reciprocating compressor
    - NPO-14597 B79-10407 07
    - Improved piston rings for a stirling engine
      - NPO-14497 B79-10412 07

**PLASMA SPRAYING**

- A plasma-sprayed valve coating
  - M-FS-19494 B79-10568 08

**PLASTIC COATINGS**

- Temporary insulation with polyurethane foam
  - MSC-18298 B79-10139 08
  - Distortion-free foamed-plastic parts
    - ARC-11233 B79-10277 08

**PLASTIC FLOW**

- An improved capillary rheometer
  - NPO-14501 B79-10366 04

**PLASTIC TAPES**

- Temporary insulation with polyurethane foam
  - MSC-18298 B79-10139 08

**PLASTICS**

- Room-temperature bonding of thin plastic sheets
  - NPO-14346 B79-10138 08
  - Distortion-free foamed-plastic parts
    - ARC-11233 B79-10277 08

**PLOTTING**

- Generalized plotting and contouring package
  - GSFC-12367 B79-10592 09

**PLUGGING**

- Removable fastener for insulating tiles
  - MSC-16483 B79-10124 07

**PLUGS**

- A simple self-sealing plug
  - MSC-19635 B79-10548 07

**POLARIZED RADIATION**

- Low-noise spectrophone
  - NPO-14362 B79-10040 03

**POLLUTION**

- Burning crude oil without pollution
  - NPO-14344 B79-10078 04

**POLLUTION CONTROL**

- Irradiation pretreatment for coal desulfurization
  - NPO-14104 B79-10069 04

**POLLUTION MONITORING**

- LANDSAT and water pollution
  - M-FS-25099 B79-10151 09
  - Thermoluminescence analysis of aerosols
    - LANGLEY-12046 B79-10208 04

- Monitoring harmful gases
  - KSC-11086 B79-10211 04
  - Analyzing water resources
    - M-FS-25104 B79-10235 05
    - Indirect microbial detection
      - LANGLEY-12520 B79-10515 05

**POLYCARBONATES**

- Improved metalized polycarbonate capacitor
  - M-FS-25142 B79-10156 01

**POLYIMIDE RESINS**

- Determining resin/fiber content of laminates
  - LANGLEY-12442 B79-10216 04

**POLYIMIDES**

- High-temperature adhesives for polyimide films
  - LANGLEY-12348 B79-10214 04
  - Composite bearing liners have service temperature of 600 F
    - LEWIS-13277 B79-10261 07
    - Self-curing polyimide foam
      - ARC-11170 B79-10507 04

**POLYMER CHEMISTRY**

- Heat- and chemical-resistant oxadiazole elastomers
  - ARC-11253 B79-10355 04

**POLYMER PHYSICS**

- Relating viscosity to polymer concentration
  - NPO-14609 B79-10357 04

**POLYMERIC FILMS**

- Measuring the thickness of plastic films
  - ARC-11219 B79-10098 06
  - Room-temperature bonding of thin plastic sheets
    - NPO-14346 B79-10138 08
    - Lightweight, economical solar concentrator
      - M-FS-23727 B79-10180 03
      - Vacuum casting of thick polymeric films
        - NPO-14534 B79-10278 08
        - Low-cost, high-performance separator for alkaline batteries
          - LEWIS-12972 B79-10281 08
          - Heat-shrinkable film improves adhesive bonds
            - MSC-18437 B79-10429 08
            - Detecting insulation defects in metal/plastic films
              - M-FS-25127 B79-10524 06

**POLYMERIZATION**

- Four-step reaction for polytriazine elastomers
  - ARC-11248 B79-10354 04

**POLYURETHANE FOAM**

- Temporary insulation with polyurethane foam
  - MSC-18298 B79-10139 08
  - Post-processing flame-retardant for polyurethane
    - MSC-16307 B79-10361 04

**POLYVINYL ALCOHOL**

- Low-cost, high-performance separator for alkaline batteries
  - LEWIS-12972 B79-10281 08

**PORCELAIN**

- Low absorptance porcelain-on-aluminum coating
  - M-FS-23879 B79-10077 04

**POROSITY**

- Balanced-force flow-regulator valve
  - MSC-12731 B79-10419 07

**PORTS (OPENINGS)**

- Window with integral seal
  - MSC-16490 B79-10141 08

- A simple self-sealing plug  
MSC-19635 B79-10548 07
- POSITION (LOCATION)**  
Cable-fault locator  
KSC-10899 B79-10024 02
- POTABLE WATER**  
Continuous sterilization of plumbing systems  
KSC-11085 B79-10079 04
- POWDER METALLURGY**  
Cleaning contaminated superalloy powders  
LEWIS-13041 B79-10279 08
- POWER**  
An annotated energy bibliography  
LANGLEY-12488 B79-10065 03
- POWER AMPLIFIERS**  
Stable S-band power amplifier  
NPO-14443 B79-10313 01
- POWER CONDITIONING**  
Fast-response power saver for induction motors  
M-FS-23988 B79-10004 01  
Solar power conditioner  
NPO-14356 B79-10035 03
- POWER EFFICIENCY**  
Controller for a string engine  
NPO-14388 B79-10130 07  
Switching reduces computer power requirement  
LANGLEY-11958 B79-10480 02
- POWER LIMITERS**  
Solid-state power controller  
MSC-16661 B79-10300 01
- POWER LINES**  
Cable-fault locator  
KSC-10899 B79-10024 02  
Simpler cabling and power link for remote readouts  
GSFC-12411 B79-10028 02  
Strain relief for power-cable connectors  
MSC-19497 B79-10310 01
- POWER SUPPLIES**  
Reliable inverter systems  
NPO-14163 B79-10026 02
- PREAMPLIFIERS**  
Improved InSb photodiode preamplifier circuit  
NPO-14418 B79-10007 01
- PRESSING (FORMING)**  
Evacuated-displacement compression molding  
LANGLEY-12523 B79-10584 08
- PRESSURE CHAMBERS**  
Safety shield for vacuum/pressure-chamber windows  
GSFC-12513 B79-10391 06
- PRESSURE MEASUREMENTS**  
All-electric gas detector  
NPO-14341 B79-10039 03  
Faired instrumentation for aerodynamic tests  
LANGLEY-11201 B79-10385 06  
Fan noise-mode structure in a duct  
LEWIS-13129 B79-10393 06  
Tire-pressure measuring concept  
MSC-18490 B79-10522 06
- PRESSURE REGULATORS**  
Dynamic-pressure regulator  
MSC-18415 B79-10418 07
- PRESSURE SENSORS**  
Transducer with a sense of touch  
NPO-14656 B79-10161 01  
Detecting leaks in vacuum bags  
MSC-18423 B79-10380 06  
Onsite testing of pressure sampling  
LANGLEY-12428 B79-10526 06
- Miniature motor-driven instrument valve  
LEWIS-13195 B79-10549 07
- PRESSURE VESSELS**  
Estimating effects of accidental propellant explosions  
LEWIS-13247 B79-10252 06  
Multipurpose seals for pressure vessels  
LEWIS-12944 B79-10263 07
- PRINTED CIRCUITS**  
Wraparound-contact solar cells  
LEWIS-13089 B79-10001 01  
Troubleshooting plated-wire memories  
M-FS-23903 B79-10099 06  
Photomask and pattern programs  
NPO-14419 B79-10434 08  
Securing connector pins to a PC board  
MSC-16059 B79-10564 08
- PROBABILITY FUNCTIONS**  
Reliability of nondestructive evaluation data  
LEWIS-12908 B79-10257 06
- PROCESSING**  
Remote manipulator for IC wafers  
M-FS-23846 B79-10122 07  
CMOS/SOS processing  
M-FS-25176 B79-10431 08
- PROCUREMENT**  
Cost analysis of hot-air solar-heating systems  
M-FS-25092 B79-10063 03
- PRODUCTION ENGINEERING**  
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M-FS-23826 B79-10245 06
- Economical solder connections to thin films  
GSFC-12404 B79-10286 08
- New approach to purifying silicon  
NPO-14474 B79-10367 04
- Solar-cell defect analyzer  
NPO-14476 B79-10379 06

- Low-cost production of solar-cell panels  
NPO-14453 B79-10432 08
- Solar array manufacturing industry simulation  
NPO-14747 B79-10435 08
- Nuclear electro-optic power  
LANGLEY-12496 B79-10481 03
- Measuring transmissivity of solar-cell covers  
NPO-14638 B79-10485 03
- SOLAR COLLECTORS**
- Solar-powered pump  
M-FS-23996 B79-10033 03
- Sun tracker for clear or cloudy weather  
M-FS-23999 B79-10036 03
- Rankine-cycle solar-cooling systems  
M-FS-25094 B79-10051 03
- Static load testing of a liquid solar collector  
M-FS-25115 B79-10057 03
- Liquid solar collector-performance evaluation  
M-FS-25090 B79-10058 03
- Weathering of a liquid-filled solar collector  
M-FS-25113 B79-10059 03
- Design of a concentrating solar collector  
M-FS-25098 B79-10060 03
- Concentrating solar collector-performance tests  
M-FS-25086 B79-10061 03
- Controller for solar heating-design package  
M-FS-25009 B79-10062 03
- Single-axle, double-axis solar tracker  
M-FS-23267 B79-10177 03
- High-performance solar collector  
M-FS-25135 B79-10178 03
- Simple, economical solar collector  
M-FS-25109 B79-10179 03
- Lightweight, economical solar concentrator  
M-FS-23727 B79-10180 03
- Performance after weathering of a liquid solar collector  
M-FS-25137 B79-10194 03
- Design review of a liquid solar collector  
M-FS-25140 B79-10199 03
- Development of nonmetallic solar collector and solar-powered pump  
M-FS-25143 B79-10200 03
- SOLAR ENERGY**
- Wraparound-contact solar cells  
LEWIS-13089 B79-10001 01
- Solar-powered pump  
M-FS-23996 B79-10033 03
- Transparent solar cell module  
NPO-14304 B79-10034 03
- Solar power conditioner  
NPO-14356 B79-10035 03
- Variable-shape solar-energy concentrator  
NPO-13736 B79-10038 03
- Theory of back-surface-field solar cells  
NPO-14451 B79-10050 03
- Rankine-cycle solar-cooling systems  
M-FS-25094 B79-10051 03
- Rankine-cycle heating and cooling systems  
M-FS-23998 B79-10052 03
- Solar-heating system-performance tests  
M-FS-25116 B79-10054 03
- Performance test for a solar water heater  
M-FS-25114 B79-10055 03
- Air solar collector-installation package  
M-FS-25031 B79-10056 03
- Static load testing of a liquid solar collector  
M-FS-25115 B79-10057 03
- Weathering of a liquid-filled solar collector  
M-FS-25113 B79-10059 03
- Design of a concentrating solar collector  
M-FS-25098 B79-10060 03
- Solar energy for industrial process heat  
NPO-14498 B79-10064 03
- A continuous silicon-coating facility  
NPO-14373 B79-10072 04
- Silicon tetrachloride spray feeder  
NPO-14382 B79-10073 04
- A reactor for more efficient solar cells  
NPO-14381 B79-10074 04
- Plastic film insulates solar cells from metal substrate  
M-FS-25007 B79-10145 08
- Cutting silicon for solar cells  
NPO-14406 B79-10146 08
- Photocapacitive infrared detector and solar cell  
LANGLEY-12345 B79-10162 01
- Navigation-aid power systems  
NPO-14466 B79-10176 02
- Single-axle, double-axis solar tracker  
M-FS-23267 B79-10177 03
- High-performance solar collector  
M-FS-25135 B79-10178 03
- Simple, economical solar collector  
M-FS-25109 B79-10179 03
- Lightweight, economical solar concentrator  
M-FS-23727 B79-10180 03
- Pointing errors in solar dish collectors  
NPO-14630 B79-10181 03
- Performance evaluation of a liquid solar collector  
M-FS-25026 B79-10189 03
- Design and installation of a solar-powered hot-water system  
M-FS-25080 B79-10190 03
- The design of solar-heating systems  
M-FS-25108 B79-10191 03
- The design of solar-heating and cooling systems  
M-FS-25106 B79-10192 03
- Design package for a solar-heating system  
M-FS-25136 B79-10193 03
- Performance after weathering of a liquid solar collector  
M-FS-25137 B79-10194 03
- Modular solar-heating system - design package  
M-FS-25130 B79-10195 03
- Concentric-tube solar collector  
M-FS-25133 B79-10196 03
- Performance verification of an air solar collector  
M-FS-25131 B79-10197 03
- Preliminary design of an air solar collector  
M-FS-25138 B79-10198 03
- Design review of a liquid solar collector  
M-FS-25140 B79-10199 03
- Development of nonmetallic solar collector and solar-powered pump  
M-FS-25143 B79-10200 03
- Certification tests on the solar-powered pump  
M-FS-25144 B79-10201 03
- Cost-reduction analysis for a solar-heating system  
M-FS-25152 B79-10202 03
- High-temperature adhesives for polyimide films  
LANGLEY-12348 B79-10214 04
- Improved inverted Stepanov apparatus  
NPO-14297 B79-10223 04
- Solar-powered jet refrigerator  
NPO-14550 B79-10251 06
- Economical solder connections to thin films  
GSFC-12404 B79-10286 08
- All-glass solar collector  
M-FS-23870 B79-10334 03
- Solar-heating system design package  
M-FS-25226 B79-10335 03
- Test and evaluation of a solar-heating system  
M-FS-25201 B79-10336 03
- Installation package for a solar-heating system  
M-FS-25198 B79-10337 03
- Verification tests for a solar-heating system  
M-FS-25178 B79-10338 03
- Residential solar-heating/cooling system  
M-FS-25166 B79-10339 03
- Installation package for a solar-heating system  
M-FS-25157 B79-10340 03
- Liquid solar collector  
M-FS-25218 B79-10341 03
- Final report on the concentric-tube solar collector  
M-FS-25188 B79-10342 03
- Collector performance at various air-channel depths  
M-FS-25159 B79-10343 03
- Fin-tube solar collectors  
M-FS-25238 B79-10344 03
- Certification of the concentrating solar collector  
M-FS-25220 B79-10345 03
- Collector performance after weathering  
M-FS-25187 B79-10346 03
- Concentrating solar collector - final design  
M-FS-25186 B79-10347 03
- Weathering of a flat-plate solar collector  
M-FS-25160 B79-10348 03
- Solar insulation model  
NPO-14787 B79-10350 03
- Programable solar-energy controller  
M-FS-25189 B79-10495 03
- Weathering of a liquid solar collector  
M-FS-25300 B79-10496 03
- Testing of a solar collector with concentrating mirrors  
M-FS-25310 B79-10497 03
- Installation package - home solar heater  
M-FS-25338 B79-10498 03
- SOLAR ENERGY ABSORBERS**
- Low absorptance porcelain-on-aluminum coating  
M-FS-23879 B79-10077 04
- SOLAR HEATING**
- Solar-powered pump  
M-FS-23996 B79-10033 03
- Rankine-cycle heating and cooling systems  
M-FS-23998 B79-10052 03

- Design information for solar-heating systems  
M-FS-25097 B79-10053 03
- Solar-heating system-performance tests  
M-FS-25116 B79-10054 03
- Performance test for a solar water heater  
M-FS-25114 B79-10055 03
- Static load testing of a liquid solar collector  
M-FS-25115 B79-10057 03
- Liquid solar collector-performance evaluation  
M-FS-25090 B79-10058 03
- Weathering of a liquid-filled solar collector  
M-FS-25113 B79-10059 03
- Design of a concentrating solar collector  
M-FS-25098 B79-10060 03
- Concentrating solar collector-performance tests  
M-FS-25086 B79-10061 03
- Controller for solar heating-design package  
M-FS-25009 B79-10062 03
- Cost analysis of hot-air solar-heating systems  
M-FS-25092 B79-10063 03
- SOLAR POSITION**  
Sun tracker for clear or cloudy weather  
M-FS-23999 B79-10036 03
- SOLAR SAILS**  
Room-temperature bonding of thin plastic sheets  
NPO-14346 B79-10138 08
- SOLDERED JOINTS**  
Stress-relieved solder joints  
MSC-14981 B79-10556 08
- SOLDERING**  
Economical solder connections to thin films  
GSFC-12404 B79-10286 08
- SOLID LUBRICANTS**  
RF-sputtered and ion-plated solid lubricants  
LEWIS-13147 B79-10433 08
- SONAR**  
Microprocessor-based interface for oceanography  
NPO-14566 B79-10173 02
- SOUND GENERATORS**  
Improved acoustic levitation apparatus  
M-FS-25050 B79-10567 08
- SOUND PRESSURE**  
Overall loudness of steady sounds  
LEWIS-12914 B79-10538 06
- SOUND TRANSMISSION**  
Measuring acoustic properties of materials and jet nozzles  
LEWIS-13265 B79-10521 06
- SPACE SHUTTLES**  
Test-configuration identifiers  
KSC-11087 B79-10102 06
- Repairing cracked glass  
KSC-11097 B79-10134 08
- Fixture for limited-access welding  
MSC-16698 B79-10135 08
- SPACEBORNE PHOTOGRAPHY**  
Automatically classifying Earth features from orbit  
LANGLEY-12589 B79-10493 03
- SPACECRAFT CONFIGURATIONS**  
Test-configuration identifiers  
KSC-11087 B79-10102 06
- SPACECRAFT STRUCTURES**  
Giant-electrode welder  
LANGLEY-11429 B79-10136 08
- SPACECRAFT TRAJECTORIES**  
Goddard trajectory determination  
GSFC-11946 B79-10114 06
- Spacecraft trajectory  
LEWIS-13248 B79-10546 06
- SPARK GAPS**  
An improved welding-arc starter  
MSC-17415 B79-10575 08
- SPECIFIC HEAT**  
Containerless high-temperature calorimeter  
M-FS-23923 B79-10086 06
- SPECTRA**  
Optical system for multispectral scanner  
MSC-18255 B79-10047 03
- SPECTRAL SIGNATURES**  
LANDSAT signature development program  
KSC-11113 B79-10501 03
- SPECTROMETERS**  
Improved InSb photodiode preamplifier circuit  
NPO-14418 B79-10007 01
- Optically coupling tunable diode lasers  
LANGLEY-12438 B79-10043 03
- Optical system for multispectral scanner  
MSC-18255 B79-10047 03
- Remote measurement of atmospheric pollutants  
LANGLEY-12277 B79-10210 04
- High-resolution spectrometer  
NPO-14372 B79-10328 03
- SPECTROSCOPY**  
Flat-flame burner  
LEWIS-13161 B79-10218 04
- SPECTRUM ANALYSIS**  
Unresolved Mossbauer hyperfine spectra  
LANGLEY-12439 B79-10513 04
- SPEED CONTROL**  
Controller for a string engine  
NPO-14388 B79-10130 07
- SPlicing**  
Splicing single-mode optical fibers  
NPO-14626 B79-10282 08
- Crimped thermocouple connections  
MSC-18489 B79-10561 08
- SPOT WELDS**  
Giant-electrode welder  
LANGLEY-11429 B79-10136 08
- SPRAY NOZZLES**  
Silicon tetrachloride spray feeder  
NPO-14382 B79-10073 04
- SPRAYED COATINGS**  
Inspecting cracks in foam insulation  
M-FS-23799 B79-10107 06
- SPRAYERS**  
Silicon tetrachloride spray feeder  
NPO-14382 B79-10073 04
- Rotatable fixture for spray coating  
ARC-11110 B79-10274 08
- Recirculating sprayer for fiber-filled paints  
KSC-11146 B79-10552 07
- SPRAYING**  
Flat-flame burner  
LEWIS-13161 B79-10218 04
- SPUTTERING**  
RF-sputtered and ion-plated solid lubricants  
LEWIS-13147 B79-10433 08
- Multilayer metalization of MOS IC's  
M-FS-23541 B79-10562 08
- STAINLESS STEELS**  
Brazing titanium to stainless steel  
LANGLEY-11441 B79-10577 08
- STANDARDS**  
Group-delay standards  
NPO-13938 B79-10014 01
- Proposed Josephson voltage standard  
M-FS-23845 B79-10482 03
- STARK EFFECT**  
All-electric gas detector  
NPO-14341 B79-10039 03
- Low-noise spectrophone  
NPO-14362 B79-10040 03
- Differential spectrophone  
NPO-14599 B79-10182 03
- STARS**  
SKYMAP star catalog  
GSFC-12445 B79-10205 03
- STATIC PRESSURE**  
Static load testing of a liquid solar collector  
M-FS-25115 B79-10057 03
- STATISTICAL ANALYSIS**  
Computing time- and frequency-domain analysis  
FRC-10121 B79-10439 09
- Image-analysis library  
MSC-18178 B79-10442 09
- Monte Carlo variance reduction  
M-FS-23645 B79-10499 03
- STEAM**  
Solar-powered pump  
M-FS-23996 B79-10033 03
- STERILIZATION**  
Continuous sterilization of plumbing systems  
KSC-11085 B79-10079 04
- Indirect microbial detection  
LANGLEY-12520 B79-10515 05
- STORAGE TANKS**  
Cryogenic-container suspension strap  
ARC-11157 B79-10260 07
- STORMS (METEOROLOGY)**  
Meteorological data-processing package  
GSFC-12372 B79-10206 03
- STRAIN GAGES**  
Attaching strain transducers to fragile materials  
MSC-16580 B79-10105 06
- Displacement gage modified for multiple measurements  
LEWIS-13036 B79-10238 06
- Noncontact strain measurement  
LEWIS-13091 B79-10243 06
- STRAPS**  
Cryogenic-container suspension strap  
ARC-11157 B79-10260 07
- STRESS CORROSION**  
Stress corrosion in high-strength aluminum alloys  
M-FS-23986 B79-10372 04
- Synthetic seawater as stress-corrosion test medium  
M-FS-22706 B79-10523 06
- STRESS RELIEVING**  
Stress-relieved solder joints  
MSC-14981 B79-10556 08
- STRUCTURAL ANALYSIS**  
Minicomputer version of SPAR  
LANGLEY-12370 B79-10115 06
- Nonlinear structural analysis  
M-FS-25122 B79-10539 06
- Redundant structures at elevated temperatures  
MSC-18476 B79-10540 06

**STRUCTURAL DESIGN**

- Minicomputer version of SPAR  
LANGLEY-12370 B79-10115 06
- Use of composites in electric vehicles  
NPO-14615 B79-10226 04

**STRUCTURAL DESIGN CRITERIA**

- Accurate determination of work in three-point bend tests  
LEWIS-13034 B79-10236 06

**STRUCTURAL FAILURE**

- Predicting the wet strength of laminates  
MSC-18022 B79-10242 06

**STRUCTURAL MEMBERS**

- Extendable mast  
LANGLEY-12078 B79-10267 07

**STRUCTURAL RELIABILITY**

- Reliability of nondestructive evaluation data  
LEWIS-12908 B79-10257 06

**STRUCTURAL STABILITY**

- Dynamic simulation and stability analysis  
GSFC-12422 B79-10113 06
- Structurally-continuous composite corners  
LANGLEY-11942 B79-10586 08

**STRUCTURAL STRAIN**

- Testing panels in shear and biaxial compression  
MSC-16132 B79-10241 06

**STRUCTURES**

- Giant-electrode welder  
LANGLEY-11429 B79-10136 08

**STUDS (STRUCTURAL MEMBERS)**

- Screw/stud removal tool  
M-FS-22957 B79-10553 07

**SUBROUTINES**

- Hinge-connected rigid bodies  
NPO-11964 B79-10116 06

**SUBSONIC FLOW**

- Advanced-panel pilot code  
ARC-11278 B79-10255 06

**SUBSONIC SPEED**

- Interfering surfaces in subsonic, transonic, and supersonic flow  
LANGLEY-12524 B79-10398 06

**SUBSTRATES**

- Quality control during IC processing  
M-FS-25112 B79-10288 08

**SULFUR**

- Soda ash removes sulfur from fuels  
GSFC-12403 B79-10071 04
- Burning crude oil without pollution  
NPO-14344 B79-10078 04

**SULFUR OXIDES**

- Soda ash removes sulfur from fuels  
GSFC-12403 B79-10071 04
- Burning crude oil without pollution  
NPO-14344 B79-10078 04
- Simultaneous stack-gas scrubbing and waste water treatment  
MSC-16258 B79-10502 04

**SUN**

- Sun tracker for clear or cloudy weather  
M-FS-23999 B79-10036 03

**SUNLIGHT**

- Solar insulation model  
NPO-14787 B79-10350 03
- Energy saver for industrial lighting  
KSC-11103 B79-10388 06

**SUPERHIGH FREQUENCIES**

- Low-backlobe microwave transmitting horn  
NPO-14077 B79-10003 01

- Analysis of aperture antenna radiation pattern  
MSC-16246 B79-10066 03

**SUPERSONIC BOUNDARY LAYERS**

- Flow fields in supersonic inlets  
ARC-11098 B79-10253 06
- Advanced-panel pilot code  
ARC-11278 B79-10255 06

**SUPERSONIC SPEEDS**

- Wing and leading-edge thrust  
LANGLEY-12516 B79-10545 06

**SUPPORT SYSTEMS**

- Goddard trajectory determination  
GSFC-11946 B79-10114 06

**SUPPORTS**

- Noninterfering support for aerodynamic models  
LANGLEY-12441 B79-10250 06

**SUPPRESSORS**

- Metallic vibration isolators  
M-FS-23949 B79-10129 07

**SURFACE CRACKS**

- Resonant-fatigue cracking apparatus  
LEWIS-13037 B79-10520 06

**SURFACE DEFECTS**

- Improved flaw-detection method  
LANGLEY-11866 B79-10378 06
- Gage for 3-d contours  
MSC-19589 B79-10383 06
- Triple-exposure holography for materials tests  
M-FS-25180 B79-10519 06

**SURFACE FINISHING**

- A continuous silicon-coating facility  
NPO-14373 B79-10072 04
- Applying photosensitive emulsions to enamel surfaces  
MSC-18107 B79-10144 08
- Precise wet-chemical etching  
NPO-14339 B79-10364 04
- Long-wearing TFE/metal bearings  
MSC-15994 B79-10409 07

**SURFACE LAYERS**

- Rotatable fixture for spray coating  
ARC-11110 B79-10274 08

**SURFACE PROPERTIES**

- Determination of total surface reflectivity  
M-FS-25024 B79-10100 06

**SURGERY**

- Coupler for surgery on small animals  
ARC-11114 B79-10230 05

**SURGES**

- Surge protection with automatic reset  
MSC-18356 B79-10305 01

**SURVEYS**

- Analyzing Earth's surface data  
M-FS-25051 B79-10152 09

**SUSPENDING (HANGING)**

- Cryogenic-container suspension strap  
ARC-11157 B79-10260 07

**SWELLING**

- Equilibrium swelling of elastomers in solvents  
NPO-14637 B79-10359 04

**SWEEP WINGS**

- Transonic flow past swept wings  
LANGLEY-12446 B79-10542 06

**SWITCHES**

- Fiber-optic crossbar switch  
KSC-11104 B79-10006 01
- Bond graph for modeling valves and switches  
LEWIS-13177 B79-10269 07
- Automatic thermal switch  
GSFC-12415 B79-10400 07

- Low-cost, lightweight RF transfer switch  
MSC-16907 B79-10453 01
- A reliable solid-state RF transfer switch  
MSC-16890 B79-10454 01

**SWITCHING**

- Versatile digital signal processor for dc to dc converters  
LEWIS-13020 B79-10158 01
- Low-EMI solid-state relay  
MSC-12698 B79-10446 01
- Switching reduces computer power requirement  
LANGLEY-11958 B79-10480 02
- Switchbox for welding torches  
M-FS-19354 B79-10578 08

**SWITCHING CIRCUITS**

- Components for an S-band communication subsystem  
NPO-13955 B79-10022 02
- Reliable inverter systems  
NPO-14163 B79-10026 02
- A telephone multiline signaling system  
KSC-11023 B79-10030 02
- Solid-state power controller  
MSC-16661 B79-10300 01
- Minimizing spikes in switching-regulator circuits  
NPO-14505 B79-10303 01
- Overload protection for switching regulators  
MSC-18513 B79-10450 01
- Conserving power in computer memories  
LANGLEY-11952 B79-10477 02
- Improved switch-resistor packaging  
MSC-19531 B79-10565 08

**SYNTHETIC ARRAYS**

- Eliminating clutter in synthetic-aperture radar  
NPO-14035 B79-10019 02

**SYSTEM EFFECTIVENESS**

- Redundant system reliability analysis  
LANGLEY-12069 B79-10153 09

**SYSTEM FAILURES**

- Fault-tolerant computer system  
NPO-14562 B79-10171 02

**SYSTEMS ANALYSIS**

- Redundant system reliability analysis  
LANGLEY-12069 B79-10153 09

**T**

**T SHAPE**

- Precision leveling of large machinery  
NPO-13257 B79-10131 07

**TEFLON (TRADEMARK)**

- Friction coefficients of PTFE bearing liner  
M-FS-19389 B79-10111 06
- Long-wearing TFE/metal bearings  
MSC-15994 B79-10409 07

**TELECOMMUNICATION**

- Improved isolation in double-balanced mixers  
NPO-14415 B79-10012 01
- Comparing data transmission systems  
NPO-14642 B79-10290 09

**TELEMETRY**

- Maximum-likelihood data decoder  
NPO-13574 B79-10172 02
- Comparing data transmission systems  
NPO-14642 B79-10290 09
- Monitoring fetal pH by telemetry  
GSFC-12507 B79-10517 05



## TELEPHONES

### TELEPHONES

A telephone multiline signaling system  
KSC-11023 B79-10030 02

### TELEPHONY

Teletype test unit  
LANGLEY-12527 B79-10166 02

### TELETYPEWRITER SYSTEMS

Teletype test unit  
LANGLEY-12527 B79-10166 02

### TELEVISION EQUIPMENT

Real-time video-image analysis  
NPO-14282 B79-10018 02  
Centering images in split-screen TV display  
MSC-18399 B79-10319 02

### TELEVISION SYSTEMS

Electronic pictures from charged-coupled devices  
GSFC-12324 B79-10015 02  
Improving low-illumination video  
MSC-14841 B79-10016 02  
Focusing laser scanner  
M-FS-25102 B79-10184 03

### TELEVISION TRANSMISSION

TV audio and video on the same channel  
MSC-16241 B79-10017 02

### TEMPERATURE CONTROL

Air solar collector-installation package  
M-FS-25031 B79-10056 03  
Containerless high-temperature calorimeter  
M-FS-23923 B79-10086 06  
Temperature controller for crystal resonators  
NPO-14507 B79-10295 01  
Liquid/liquid heat exchanger  
NPO-14271 B79-10329 03  
No-reheat air-conditioning  
GSFC-12191 B79-10330 03  
Zone-controlled resistance heater  
MSC-16251 B79-10387 06  
Automatic thermal switch  
GSFC-12415 B79-10400 07  
Installation package - home solar heater  
M-FS-25338 B79-10498 03

### TEMPERATURE EFFECTS

Friction coefficients of PTFE bearing liner  
M-FS-19389 B79-10111 06

### TEMPERATURE MEASUREMENT

Controller for solar heating-design package  
M-FS-25009 B79-10062 03  
Compact thermocouple reference for vacuum chambers  
MSC-19651 B79-10389 06  
Semiconductor step-stress testing  
M-FS-25329 B79-10455 01

### TEMPERATURE PROBES

Rugged fast-response temperature probe  
ARC-11289 B79-10531 06

### TEMPLATES

Plug and drill template  
MSC-16748 B79-10120 07

### TENSILE STRENGTH

Strength enhancement of prealloyed powder superalloys  
LEWIS-13173 B79-10221 04

### TENSILE TESTS

Graphite/epoxy-tape test specimens  
MSC-18495 B79-10527 06

### TEST FACILITIES

Test-configuration identifiers  
KSC-11087 B79-10102 06

Graphite/epoxy-tape test specimens  
MSC-18495 B79-10527 06

### TESTS

Test-configuration identifiers  
KSC-11087 B79-10102 06

### TEXTILES

Flame-resistant textiles  
MSC-18359 B79-10353 04

### THERAPY

Eye-controlled switch  
M-FS-25091 B79-10084 05

### THERMAL ABSORPTION

Weathering of a liquid-filled solar collector  
M-FS-25113 B79-10059 03  
Concentrating solar collector-performance tests  
M-FS-25086 B79-10061 03

### THERMAL CONDUCTIVITY

Fibrous refractory composite insulation  
ARC-11169 B79-10224 04

### THERMAL CONDUCTORS

Improved thermal-conducting and current-confining film  
LANGLEY-12350 B79-10489 03

### THERMAL CYCLING TESTS

Improved metalized polycarbonate capacitor  
M-FS-25142 B79-10156 01

### THERMAL DIFFUSION

Separating liquid and gaseous solutions  
M-FS-23368 B79-10506 04

### THERMAL EXPANSION

Thermal jack  
M-FS-19365 B79-10579 08

### THERMAL INSULATION

Inspecting cracks in foam insulation  
M-FS-23799 B79-10107 06  
Measuring insulation thickness  
M-FS-23798 B79-10108 06  
Cryogenic-container suspension strap  
ARC-11157 B79-10260 07  
Rotatable fixture for spray coating  
ARC-11110 B79-10274 08  
Double-wall tubing for oil recovery  
NPO-14606 B79-10360 04  
Water-cooled insulated steam-injection wells  
NPO-14605 B79-10369 04  
High-temperature insulation  
M-FS-19498 B79-10370 04  
Thermal seal for high and low temperatures  
MSC-16151 B79-10413 07  
Flexible heat-and-pressure seal  
MSC-18134 B79-10414 07  
Vacuum-bonded covering withstands low temperatures  
MSC-16235 B79-10509 04

### THERMAL PROTECTION

Improved temperature-control garment  
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Isolator/retainer for connectors  
MSC-18527 B79-10312 01
- ANDERSON, A. N.**  
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MSC-19623 B79-10571 08
- ANGLIN, A. E.**  
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LEWIS-13041 B79-10279 08
- ANSELMO, V. J.**  
Microcomputer helps evaluate skin burns  
NPO-14402 B79-10082 05
- ANTHONY, K.**  
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M-FS-25109 B79-10179 03
- ANTONIDES, G. J.**  
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NPO-14304 B79-10034 03
- APPLEBERRY, W. T.**  
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MSC-19514 B79-10401 07  
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MSC-19511 B79-10534 06
- ARENS, W. E.**  
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NPO-14019 B79-10020 02
- ARLINE, J.**  
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KSC-11103 B79-10388 06
- ARMENOFF, C. T.**  
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M-FS-19365 B79-10579 08  
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- ARMSTRONG, J.**  
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NPO-14266 B79-10377 05
- ASHMORE, L. O.**  
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MSC-18490 B79-10522 06
- ASHWORTH, B. R.**  
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LANGLEY-12167 B79-10029 02
- ATARAS, W. S.**  
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- ATKINS, B. R.**  
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LANGLEY-11429 B79-10136 08
- AVIZIENIS, A. A.**  
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NPO-14562 B79-10171 02
- BACK, L. H.**  
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- BAKER, C. M.**  
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- BAKER, W. E.**  
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LEWIS-13247 B79-10252 06
- BALES, M.**  
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ARC-11134 B79-10185 03
- BARAJAS, S. L.**  
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MSC-16762 B79-10089 06
- BARAONA, C. R.**  
Wraparound-contact solar cells  
LEWIS-13089 B79-10001 01
- BARBIERI, R. H.**  
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NPO-14498 B79-10064 03
- BARBOUR, J. G.**  
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LANGLEY-12240 B79-10427 08
- BARKER, C.**  
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M-FS-23979 B79-10363 04
- BARNDT, R.**  
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NPO-14266 B79-10377 05
- BARNES, J. R.**  
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MSC-16370 B79-10009 01
- BARNETT, C. J.**  
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MSC-18365 B79-10403 07
- BARNEY, T. W.**  
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M-FS-25111 B79-10150 09
- BARNES, C. E.**  
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ARC-11256 B79-10547 07
- BARR, D. J.**  
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M-FS-25111 B79-10150 09  
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M-FS-25051 B79-10152 09
- BASS, J. A.**  
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GSFC-12404 B79-10286 08
- BAGWELL, P. R.**  
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MSC-16251 B79-10387 06
- BAILEY, P. L.**  
Rugged fast-response temperature probe  
ARC-11289 B79-10531 06
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NPO-13594 B79-10168 02  
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NPO-13091 B79-10322 02
- BATISTA, R. I.**  
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- BAYLESS, E.**  
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- BEAL, J. R.**  
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- BEALL, H. C.**  
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- BEATTY, R. W.**  
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- BEEKLEY, D. C.**  
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- BEER, R.**  
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NPO-14372 B79-10328 03
- BEHAR, J. M.**  
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MSC-16490 B79-10141 08
- BEJCZY, A. K.**  
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NPO-14656 B79-10161 01  
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NPO-14653 B79-10390 06  
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NPO-14655 B79-10405 07
- BELCHER, J. G., JR.**  
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M-FS-23851 B79-10285 08
- BELL, C. H.**  
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KSC-11104 B79-10006 01
- BELL, W. F.**  
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M-FS-25196 B79-10484 03
- BELLAVIA, J., JR.**  
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- BELT, J. L.**  
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- BEMENT, L. J.**  
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- BENADO, S.**  
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- BENEFIELD, J. W.**  
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- BERGE, L. H.**  
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- BERGMAN, L. A.**  
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NPO-14582 B79-10297 01
- BERKMAN, S.**  
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- BERTINO, F.**  
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- BICKLER, D. B.**  
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NPO-14453 B79-10432 08
- BIESS, J. L.**  
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- BILLINGSLEY, J. B.**  
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- BILLINGTON, K. L.**  
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- BILLS, G. R.**  
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ARC-11278 B79-10255 06
- BIVINS, L.**  
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NPO-14672 B79-10382 06
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LEWIS-13091 B79-10243 06
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FRC-10090 B79-10445 01
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M-FS-19423 B79-10533 06
- BLAINE, J.**  
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KSC-11113 B79-10501 03
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NPO-14266 B79-10377 05
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LEWIS-12711 B79-10175 02
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NPO-14416 B79-10037 03
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M-FS-25095 B79-10593 09
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LEWIS-13033 B79-10368 04
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GSFC-12372 B79-10206 03  
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GSFC-12374 B79-10207 03
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M-FS-23267 B79-10177 03
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LANGLEY-12363 B79-10425 08
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KSC-11069 B79-10083 05
- BRIGHT, T. M.**  
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- BROOKS, S.**  
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- BROWN, J. N.**  
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- BURGESS, R. W.**  
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- BUTTER, C.**  
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NPO-14373 B79-10072 04
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Improved displacement measurement in bend testing  
LEWIS-13035 B79-10237 06  
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LEWIS-13036 B79-10238 06  
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LEWIS-12976 B79-10566 08
- BYRN, N. R.**  
Monte Carlo variance reduction  
M-FS-23645 B79-10499 03
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- CADE, D. H.**  
Removable fastener for insulating tiles  
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- CALFO, F. D.**  
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- CALLEN, W. R.**  
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- CAMBELL, L. W.**  
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- CAMPBELL, R. A.**  
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- CANRIGHT, V. R.**  
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- CARLSON, L. A.**  
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- CARROLL, W. F.**  
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- CARSON, L. M.**  
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- CASH, W. H., JR.**  
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- CASON, R. L.**  
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- CASTRUCCIO, P.**  
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NPO-14550 B79-10251 06
- CHAMBERLAIN, R. G.**  
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- CHAN, R. B.**  
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- CHANEY, R. E.**  
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- CHANG, C. C.**  
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- CHAPMAN, C. P.**  
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- CHARTIER, E. N.**  
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- CHERN, S.**  
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- CHILDRESS, C. L.**  
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- CHOW, E. Y.**  
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- CHRIST, C. R.**  
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- CLEMMONS, J. I., JR.**  
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- CODA, L. R.**  
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- COLLINS, D. D.**  
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- CONNOLLY, D. J.**  
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- CONSTABLE, R. C.**  
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- COUCH, R. H.**  
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- COX, R. L.**  
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- COYNER, J. V., JR.**  
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- CROUCH, R. K.**  
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- CUPP, J. L.**  
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- DAY, J. L.**  
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- DEAN, P. D.**  
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- DELUCA, J. J.**  
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- DERR, L. J.**  
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- DEWITT, R. R.**  
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NPO-14303 B79-10147 08
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- DOLLYHIGH, S. M.**  
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- DOOHER, J.**  
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GSFC-12403 B79-10071 04
- DORNER, J. P.**  
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Burn-test apparatus for fiber composites  
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Film-advance monitor  
LANGLEY-12474 B79-10119 07
- DUGGAN, M. F.**  
Attaching strain transducers to fragile materials  
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- DUNBAR, D. N.**  
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- LEGGETT, H.**  
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- LENNON, C. L.**  
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- LERMA, G.**  
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- LEVINE, F. E.**  
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- LEWELLEN, T. K.**  
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- LEWIS, G. W.**  
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- LICARI, J. J.**  
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- LIKINS, P. W.**  
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- LINCOLN, K. A.**  
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- LINDENA, S.**  
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- LIPOMA, P. C.**  
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MSC-18516 B79-10476 02
- LISKAY, G. G.**  
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MSC-19525 B79-10428 08
- LIU, H. K.**  
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- LOATS, H., JR.**  
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- LOFTIS, C. B., JR.**  
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- LOGSTON, H. A.**  
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- LOMBARD, J.**  
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- LOMBARDI, T.**  
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- LONG, E. R., JR.**  
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- LONG, W. C.**  
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- LOUVIERE, A. J.**  
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- LOVE, R. A.**  
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- LOVOY, C. V.**  
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- LUDWIG, A. C.**  
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- LUM, H., JR.**  
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- MACK, R. J.**  
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- MAIO, N. J.**  
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- MAJOR, R. K.**  
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- MALETZ, L. H.**  
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- MALLORY, R.**  
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- MANN, F. J.**  
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- MARGOLIS, J. S.**  
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- MARSHALL, H. H.**  
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- MARTIN, M.**  
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- MASERJIAN, J.**  
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- MASRELIEZ, C. J.**  
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- MASSEY, H. V.**  
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- MATHER, G. R., JR.**  
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- MATSUMOTO, Y.**  
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- MAY, H. S.**  
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- MAYER, L.**  
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- MCCAIG, J.**  
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- MCCANN, D. H.**  
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- MCCLURE, J. C.**  
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- MCDONALD, R. C.**  
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- MCDUGAL, A. R.**  
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- MCKOWN, R. D.**  
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- MCLYMAN, W. T.**  
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- MCSTAY, J. J.**  
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- MECKS, H. B.**  
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- MEERBAUM, S.**  
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- MEHROTRA, S. C.**  
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- MEHTA, R. K.**  
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- MENDENHALL, M. R.**  
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- MENDIRATTA, R. G.**  
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- MEREDITH, B. D.**  
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- MERRIAM, A.**  
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- MEYER, T. N.**  
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- MILLER, C. G.**  
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- MILLER, D. C.**  
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- MILLER, E. L.**  
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- MILLER, J. A.**  
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- MO, C.**  
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- MOACANIN, J.**  
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- MOORE, B. C.**  
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- MORIARTY, J. A.**  
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- MOYNIHAN, P. I.**  
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- OMALLEY, T. A.**  
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- OTOSHI, T. Y.**  
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- PARR, A. C.**  
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- PARR, R. A.**  
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- PARTHASARATHY, S. P.**  
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- POPE, D. L.**  
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- REID, W. L.**  
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- REILLY, T. H.**  
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- RICE, E. J.**  
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- RICE, S. H.**  
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- RILEY, T. J.**  
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- ROBELEN, D. B.**  
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- ROGOWSKI, R. S.**  
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| B79-10426 08 | MSC-18368     | B79-10503 04 | KSC-11135     | B79-10580 08 | M-FS-19364    |
| B79-10427 08 | LANGLEY-12240 | B79-10504 04 | LANGLEY-12249 | B79-10581 08 | M-FS-19428    |
| B79-10428 08 | MSC-19525     | B79-10505 04 | ARC-11244     | B79-10582 08 | M-FS-25181    |
| B79-10429 08 | MSC-18437     | B79-10506 04 | M-FS-23368    | B79-10583 08 | LEWIS-12721   |
| B79-10430 08 | M-FS-25132    | B79-10507 04 | ARC-11170     | B79-10584 08 | LANGLEY-12523 |
| B79-10431 08 | M-FS-25176    | B79-10508 04 | M-FS-23816    | B79-10585 08 | M-FS-25083    |
| B79-10432 08 | NPO-14453     | B79-10509 04 | MSC-16235     | B79-10586 08 | LANGLEY-11942 |
| B79-10433 08 | LEWIS-13147   | B79-10510 04 | MSC-18543     | B79-10587 08 | MSC-19664     |
| B79-10434 08 | NPO-14419     | B79-10511 04 | M-FS-23946    | B79-10588 08 | M-FS-25089    |
| B79-10435 08 | NPO-14747     | B79-10512 04 | M-FS-23359    | B79-10589 08 | M-FS-25079    |
| B79-10436 09 | LANGLEY-12492 | B79-10513 04 | LANGLEY-12439 | B79-10590 09 | LANGLEY-12126 |
| B79-10437 09 | KSC-11054     | B79-10514 04 | LANGLEY-12381 | B79-10591 09 | M-FS-25125    |
| B79-10438 09 | NPO-13777     | B79-10515 05 | LANGLEY-12520 | B79-10592 09 | GSFC-12367    |
| B79-10439 09 | FRC-10121     | B79-10516 05 | MSC-18522     | B79-10593 09 | M-FS-25095    |
| B79-10440 09 | FRC-10114     | B79-10517 05 | GSFC-12507    |              |               |
| B79-10441 09 | LANGLEY-12454 | B79-10518 05 | NPO-14329     |              |               |
| B79-10442 09 | MSC-18178     | B79-10519 06 | M-FS-25180    |              |               |
| B79-10443 09 | NPO-14105     | B79-10520 06 | LEWIS-13037   |              |               |
| B79-10444 01 | LANGLEY-12530 | B79-10521 06 | LEWIS-13265   |              |               |
| B79-10445 01 | FRC-10090     | B79-10522 06 | MSC-18490     |              |               |
| B79-10446 01 | MSC-12698     | B79-10523 06 | M-FS-22706    |              |               |
| B79-10447 01 | NPO-14530     | B79-10524 06 | M-FS-25127    |              |               |
| B79-10448 01 | MSC-14968     | B79-10525 06 | NPO-14698     |              |               |
| B79-10449 01 | M-FS-25025    | B79-10526 06 | LANGLEY-12428 |              |               |
| B79-10450 01 | MSC-18513     | B79-10527 06 | MSC-18495     |              |               |
| B79-10451 01 | NPO-14614     | B79-10528 06 | MSC-16305     |              |               |
| B79-10452 01 | MSC-14934     | B79-10529 06 | MSC-18202     |              |               |
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| B79-10454 01 | MSC-16890     | B79-10531 06 | ARC-11289     |              |               |
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| B79-10456 01 | M-FS-25243    | B79-10533 06 | M-FS-19423    |              |               |
| B79-10457 01 | M-FS-25344    | B79-10534 06 | MSC-19511     |              |               |
| B79-10458 01 | M-FS-25245    | B79-10535 06 | MSC-18371     |              |               |
| B79-10459 01 | M-FS-25246    | B79-10536 06 | M-FS-25129    |              |               |
| B79-10460 01 | M-FS-15247    | B79-10537 06 | LEWIS-12826   |              |               |
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| B79-10474 01 | M-FS-25278    | B79-10551 07 | MSC-19550     |              |               |
| B79-10475 01 | M-FS-25279    | B79-10552 07 | KSC-11146     |              |               |
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| B79-10477 02 | LANGLEY-11952 | B79-10554 07 | M-FS-19508    |              |               |
| B79-10478 02 | GSFC-12203    | B79-10555 07 | M-FS-19473    |              |               |
| B79-10479 02 | KSC-11096     | B79-10556 08 | MSC-14981     |              |               |
| B79-10480 02 | LANGLEY-11958 | B79-10557 08 | LANGLEY-11950 |              |               |
| B79-10481 03 | LANGLEY-12496 | B79-10558 08 | LANGLEY-11590 |              |               |











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